

THE IRON AGE

THURSDAY, NOVEMBER 5, 1891.

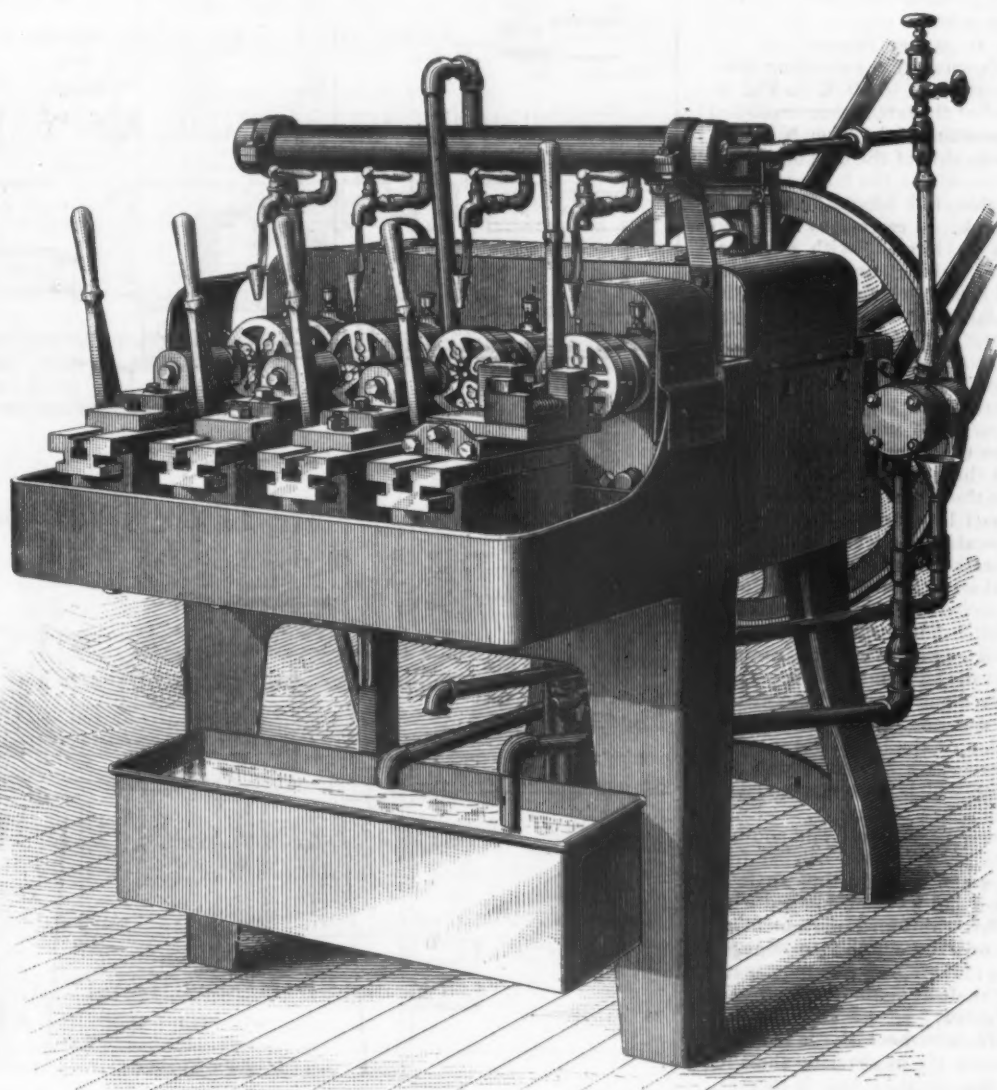
Machine for Threading Bolts.

The New York City Bolt and Nut Company, Limited, of 38 and 35 Desbrosses street, New York, have recently completed a bolt-threading machine of new design and unusual capacity. It is the invention of Emil Hubner, superintendent and manager of the company. It will thread four different sizes of bolts at the same time and four different kinds—viz., fish plate, machine, countersink and button head. It is stated that one man can thread 15,000

2 is a plan view, and Fig. 3 a vertical sectional elevation through one of the threading shafts.

The bed A of the machine is box-like in form, comprising a continuous bottom with upright sides and ends. It is rectangular in general outline and at one end is formed with an extension, A', of less width than the main bed. The latter is also provided with three transverse partitions, as shown in both drawings. The driving shaft B is mounted as shown, and extends centrally part way through the bed. On the outer

ment thereon and at the same time impart a rotary motion. The faces of the gear hubs opposed to the clutch faces of the sleeves are constructed to receive these faces. The large gears are the driving gears while the thread is being cut, and are calculated to drive the tubular shaft at a predetermined speed; the small gears act as the driving gears upon the reverse movement of the shafts, which withdraws the bolts from the dies. Since the pinions contain one-half the number of teeth that the gears do, the threaded bolt is released



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bolts during a day of ten hours with this machine. A registering attachment accurately counts the number of bolts threaded, thereby doing away with the necessity of having a man count the work performed.

In general the machine consists of four shafts, each of which carries a threading die. The bolts to be threaded are held in suitable recesses serving as chucks, the dies are advanced to thread the blank and at the proper time the motion is reversed automatically and the die withdrawn at twice the speed at which it advances. It is evident that the dies may be changed to suit the bolt it is required to thread, and that practically the four are independent in operation. Fig. 1 is a perspective view of the machine, taken from the front; Fig.

end of this shaft are secured a suitable driving pulley and fly wheel. In bearings formed near the upper edges of the partitions referred to is a series of tubular shafts, C, D, E, F, each of which at its forward end is provided with a head, to which is attached any improved form of die adapted for cutting a thread. Each shaft is further provided with two gears, a large one, G, and a smaller one or pinion, H. In order to economize space and obtain differential speed the gears are alternately arranged, the pinion on one shaft being transversely opposite the spur gear upon the next shaft, as illustrated in the plan view. Between the gears of each shaft is a sleeve, I, having clutch faces at each end, and which is splined to the shaft in order to permit longitudinal move-

at twice the speed at which the thread is cut.

A shifting shaft K is held to slide in bearings beneath each tubular shaft. These shafts are operated upon to reverse automatically in substantially the same manner, but they are differently operated upon to impart to the tubular shafts a movement for cutting the thread. A description of one will therefore suffice for all. Within the tubular shaft a rod is held to slide, the forward end of which is provided with a pin, while the rear end extends beyond the shaft and is arranged to strike against the head of a stud shown plainly in the vertical section, Fig. 3, adjustably secured to the upper end of a vertical lever, pivoted at its lower extremity upon one side of the bed extension. Upon the pivoted end of

the lever a horizontal, upwardly extending latch is attached which engages with a head upon the rear end of the shifting shaft K while the bolt is being threaded. This shaft is encircled by a spiral spring, as shown. When the head of the latch and shaft engage the spring is compressed and when the head of the shaft is released, the spring throws the shaft forward. The shifting shaft and the clutch I of the tubular shaft D are rigidly connected by a bar secured to the collar L. The forward end of the shifting shaft is connected by a link, M, with a fixing lever. When the fixing lever is pushed forward the shifting shaft is forced to an engagement with the latch. Around the fixing lever a hollow base block is erected upon the bed, having flanges at its inner edges forming slide-ways. Upon the block is a table arranged to slide longitudinally and provided with grooves in its sides to receive the slide-ways. This table has integral with its rear end a downwardly extending arm, shown to the right of shaft K in Fig. 3. The movement of the table is accomplished through the medium of the lever N, which is pivoted at one side of the base block and attached to one side of the table. A vertically adjustable tail block, designed to carry the blank, is carried by the bed block. This is formed with a recess, the interior of which corresponds with the bolt head it is to receive. When the head of the blank bolt is placed in the retaining head the end of the shank to be threaded, when the socket is properly adjusted, will be in a position to enter the dies of the cutter.

In the operation of this portion of the machine, when the thread has been cut upon the bolt the desired length the bolt presses against the pin of the sliding bar in the tubular shaft D, which at its rearward movement operates the lever sufficiently to relieve the catch from connection with the shifting shaft K, which is forced outward by the action of the spiral spring, causing the clutch I to disengage from the large gear and engage with the pinion. The movement of the tubular shaft is thus instantly reversed and the speed increased, causing the die to rapidly leave the threaded portion of the bolt. By moving the lever N forward a slight distance the entire head with which it is connected is moved in the same direction, and the finished bolt may be removed and another inserted. The lever is then carried further forward, when the shifting shaft is moved rearward and its head engaged with the latch. This continued movement of the shaft throws the clutch into engagement with the pinion, and the movement of the tubular shaft is again reversed and its speed decreased.

The rearward movement of the shifting shaft also causes the registering shaft to revolve and the finished bolt is thereby duly counted. A headstock of the construction described is provided for each tubular shaft, likewise a latch, lever and post, link lever and a ratchet wheel for recording purposes. The movement of the shifting shaft of the second tubular shaft is the reverse of that just described, the difference in operation of the two shafts being made necessary by reason of the difference in the position of the gears upon the driving tubular shafts.

In operating the machine the attention of but one man is needed. Starting at the shaft C, for instance, the bolt is placed in position to be threaded, and when it has been cut by the dies a second bolt is placed so as to be operated upon by the next shaft, D, and when this has been cut a bolt is placed in the shaft E and then in the shaft F. It will be noted that by this time the first bolt placed in position has been threaded and is ready to be removed and another one inserted. The only work required of the attendant is the insertion and removal of the bolts,

and the machine can be so speeded that his entire time will be taken up with this work. The machine is provided with an oil reservoir into which all oil drains, and from which it is conveyed to the dies by means of a pump and suitable pipes.

Trade Demoralization in Argentina.

A Buenos Ayres correspondent of the *Manchester Guardian* gives a disheartening account of the condition of trade and finance in the Argentine Republic. The worst is yet to come. At the begin-

merce, shipping, insurance, &c., have collapsed. The private and foreign banks, fearful of another run upon their reserves such as was experienced a few months since, and the like of which has not happened in any other city, have practically suspended discounting operations. Firms without available cash to buy gold with to cover their sales in paper, on credit, are compelled to buy "on time," and for this accommodation they have had to pay at the rate of 24 per cent. per annum. Credit is at a standstill, distrust is evident on every side, operations of every kind are restricted to the smallest possible dimensions, and the anxiety and tension which

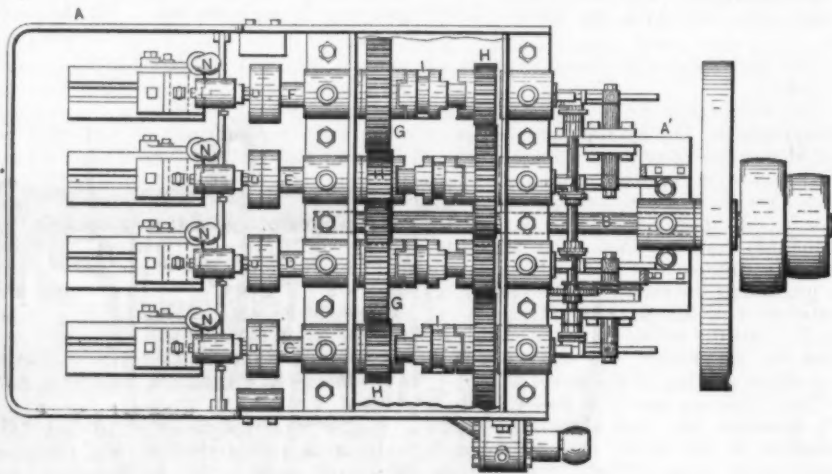


Fig. 2.—Plan.

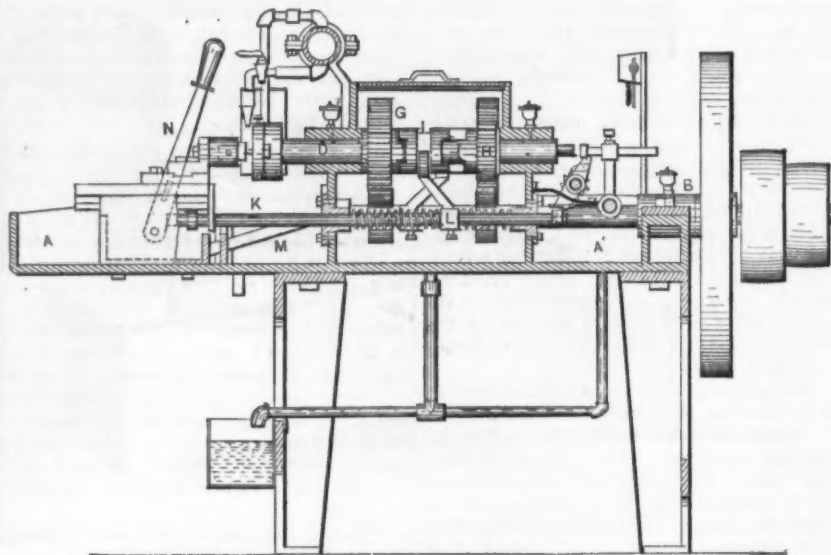


Fig. 3.—Vertical Section Through One of the Threading Shafts.

MACHINE FOR THREADING BOLTS.

ning of the year the Banco Nacional and other great financial institutions were apparently prosperous, and every one looked with certainty to the gold premium falling as soon as the agreement with the foreign bondholders for the three years' moratorium had been completed. Now the majority of these firms have either become bankrupt, made private arrangements with their creditors, or are still waiting patiently with their paper money in the banks for the gold rate, which stands at 410, to decline to 250. In addition to the collapse of the two State banks, other banks, which were certainly of some use to the commercial community, have closed their doors, hundreds of companies more or less concerned with com-

exist on account of the uncertainty of what may happen next make life from a business point of view almost unbearable. The civil and commercial courts are overburdened with work, and when it is known that 30 years ago there were two judges of commerce and that to-day there are still only two, the pressure of work is no matter of surprise, and the difficulty and delay in obtaining judicial decrees is not to be wondered at. This is in addition to the ordinary delays which seem inseparable from foreign tribunals in normal times. The cost of living, when measured in paper, has increased tremendously, and as wages, which are paid in paper, have not advanced in proportion, distress and starvation are prevalent.

Tests and Requirements of Structural Iron and Steel.

BY GUS. C. HENNING.

A. E. Hunt remarks that his paper on "Tests and Requirements of Structural Wrought Iron and Steel,"* was suggested by the appointment of committees by the American Society of Mechanical Engineers and the American Society of Civil Engineers, upon the subjects of "Standard Tests and Methods of Testing" and "Uniform Methods of Tests of Material Used in Metallic Structures" respectively, and by a study of the reports, appendices and statements proceeding from these committees. As far as the writer is aware the Civil Engineers' committee has not to this date reported or published anything whatever.

The author sees fit to criticise certain paragraphs in the preliminary report of the Mechanical Engineers' Committee, on the assumption that the recommendations made are for routine testing, while the title is "Proposed Recommendations for Standard Testing," Vol. XI, page 613, and this difference was clearly explained in presenting the report to the society, as stated in Vol. XI, page 587, Trans. A. S. M. E. All the strictures made on this report by the author, are due to a most superficial reading of the report.

The "drifting test" is dwelt upon as "a practical test that shows the actual behavior of the metal, and can be made upon scrap pieces without wasting merchantable stock and without expensive machine shop work upon the test specimens."

Inasmuch as a rough sheared scrap piece with a hole punched in it is used for this test, it will be readily seen that it can be made a correct test only when testing very low steels, as all wrought iron and other steels are considerably (injuriously) affected by punching and shearing. Furthermore, the number of blows of sledge, weight and height of fall or force of blow are not mentioned; nor the time of test or rapidity of repetition of blows, and hence it is preposterous to claim for this test that "it presents the further advantage that exact data can be obtained for records regarding it," and that "the writer believes it should be one of the standard tests of wrought iron and steel plate and shapes."

The committee of the American Society of Mechanical Engineers does not propose to recommend the hobbies of certain inspection agencies. The author further says that "the hardening or quenching test as proposed by the committee of the American Society of Mechanical Engineers is of doubtful utility, except when carefully made . . . the amount (of hardening) depending not only upon the hardness in the steel, but also upon the temperature to which it is heated and the character of the solution into which it is plunged to quench it." In describing the hardening test the report says, Volume XI, page 628:

"9. Hardening tests are to be made by making the foregoing bending test, only carrying it on to rupture, and reading the angle at which rupture occurs; then other pieces exactly similar to those thus tested are to be heated carefully to a fair red heat and then plunged into water at a temperature of 32-40° F. These quenched pieces are then to be tested precisely as those tested in their natural condition, and the angle through which they bent before fracture occurred is to be carefully noted; the difference in the amount of possible flexure in the two cases

represents the amount of hardening produced."

It will be generally admitted that tests are worthless unless carefully made, and a "fair red heat" and "water at a stated temperature" are probably sufficiently clear to most engineers who know how to test to prevent errors or misunderstanding on their part. As the author does not believe in the utility of quenching tests, and hence rarely carries them out, his opinions on this test cannot be of great weight.

It is also asserted that the "bulging test recommended by Kirkaldy, though not often used in this country, is a useful, practical measure of the ductility of the metal, and especially adaptable for testing of soft flange steel." The author, to be entirely truthful, should have said that no one but Kirkaldy makes "bulging tests." As a bulging test is nothing but a partial and indefinite bending test of a circular disk, and bending tests of soft steel are declared not "crucial" in another part of the paper, there seems to exist some contradiction. Besides, boiler plate is invariably flanged hot, and it will be admitted that a cold test of the material will not indicate its qualities when hot. It is, moreover, impossible to determine unit strains on the material due to the peculiar conditions of the test and shape with any degree of certainty, and hence cannot in any sense be an "excellent measure of ductility."

Under paragraph two is stated that "the only satisfactory method of testing finished structural open-hearth or Bessemer steel must be based on the melts as the units of quality." Whatever this may mean is very doubtful, but it is very certain that the only exact and correct method of testing structural steels (just the same as iron) is by testing pieces cut from the finished or rolled material, because heating and rolling may and do produce greater differences than exist between different heats or melts.

Under paragraph five the term "elastic limit" is repeatedly used when "yield point" is meant, and in one line it is stated that this factor is not always a safe criterion of the quality of iron or steel," while further on failure to observe the same is declared to be "an unwise omission" &c., &c. The author in this section again refers to the report of the committee A. S. M. E., and as his reference has no bearing upon the point discussed it is but fair to state that the reports of material tested do not at all refer to structural steels, but to special material obtained for test purposes. Hence the results obtained cannot be compared with those of structural material.

There are so many ambiguous phrases or clauses in the paper that it is very difficult to understand the true meaning, and it is to be hoped that such scientific terms as a "few units per cent. in ductility," "mal-treated rejected bars" &c., &c., be more fully explained.

The statement that iron having a tenacity of 52,000 pounds per square inch "should be carefully tested for welding, as it is very apt to be dry and incapable of welding" is an unwarranted criticism of the best grades of wrought iron as made by the Catasauqua Mfg. Company and the Union Iron Mills of Carnegie Bros. & Co. These irons show unusual ductility, and elongation from 20 to 27 per cent. in 8 inch, according to the section of rolled bar from which test pieces are cut, and numerous tests of welded members of widely varying section and shape have demonstrated them to be most easily and strongly weldable. These irons contained no steel scrap, but a certain percentage of Bessemer pig muck was added to other good qualities of muck bar and iron scrap, producing an unusually uniform product. Numerous

tests to prove these statements and a still greater number showing a very small percentage of rejections are available.

The New Bridge at Pittsburgh.

Work on the new suspension bridge over the Allegheny River, connecting the cities of Pittsburgh and Allegheny, is progressing rapidly. The plans for the new bridge have been somewhat revised since the original plans were drawn up. Work on the masonry has progressed very rapidly, and the middle or main piers of the structure will probably be completed this week. All the masonry work will be completed within the contract time, and the last stone will likely be laid before winter weather starts. The old toll house on the Pittsburgh end and the one on the Allegheny end have both been torn down and temporary but substantial buildings have been erected in their place. Of the three piers of the Pittsburgh abutment, the two outside ones are completed to the spring line of the arches; the foundations for the inside pier have been commenced, although the excavation for this pier will be carried on for several weeks yet. The excavation for the shore pier on the Allegheny side has been commenced. The final piece of masonry will be the Allegheny abutment, which will simply be a renewal of the present one. The progress on masonry has been very rapid, and the contractors, the Drake Stratton Company, Limited, will have it all ready for the superstructure, which will be put in place next year, although the work will not be commenced until spring. There will be no interference with either road or sidewalk travel while the bridge is being built, except a few temporary suspensions for the purpose of completing the masonry.

Carnegie, Phipps & Co., Limited, have been engaged for several months making the iron for the structure and shipping to the Union Bridge Company at Athens, Pa., who have the contract for the superstructure. They have sublet the contract to Baird Bros. of Pittsburgh. The bridge will have two spans, each 445 feet long, of the bowstring girder type, and deck plate girder span of 41½ feet, over the Pittsburgh and Western Railroad on the Allegheny side. The height of the large truss at the center is 79½ feet clear and the width of the roadway will be 40 feet, accommodating four lines of track, two to be used for street car traffic and two for wagon traffic, and the two sidewalks will be 9 feet each in the clear, protected by hand railings. The engineers are Wilkins & Davidson of Pittsburgh, who have charge, but are working under the instructions of Theo. Cooper of New York City. As stated above, the bridge will have four tracks, two to be used for street car purposes and two for wagon traffic. The street car tracks will be occupied by the electric cars of the Pittsburgh, Allegheny and Manchester Company, whose lines run from Pittsburgh to various parts of Allegheny. The old suspension bridge which is being torn down to make room for the new structure was built a great many years ago by Jno. Roebling's Sons, and is said to be the first wire cable suspension bridge ever built by that firm. It is hardly probable that the new structure will be completed before the fall of 1892.

Announcement is made that W. H. Playford, Robert Hogsett, James White and others have just purchased 3000 acres of coal on New Creek, near Clarksburg, W. Va., for \$97,663. The sale includes only the coal, and is said to be the most extensive sale ever made in that State. The company propose to start a coke plant.

* The Iron Age, October 23 and October 29, 1891.

† This should read 70-75° F.—G. C. H.

The Temescal Tin Mines.

Under date of September 24, Congressman W. W. Bowers writes from San Diego, Cal., to the *Chicago Tribune*, describing the present condition of the tin mines in San Bernardino County. We quote from his letter as follows:

The true history of the Temescal tin mines may be told quite briefly. Tin ore was discovered on the San Jacinto ranch, a Mexican grant of 48,000 acres in San Bernardino, something more than 20 years

ago. The ranch was in litigation from that time until about two years ago, when Col. E. N. Robinson—after repeated trips to England—induced English capitalists to buy the ranch. After they had sent a number of experts to examine the property they bought out every interest, getting a clear title to the 48,000 acres. The talk that "it is unfortunate that this valuable property has passed into the hands of English capitalists" is bosh. On the contrary, it is fortunate that it has, for so long as it was owned by Americans it remained as the Lord left it, and a plaything for lawyers, of no use to anybody else. When the Englishmen got hold of it they proceeded

to do something with it, to develop it, set men at work, and paid them good wages. Colonel Robinson was made the general manager of the estate, and his plan for the development of this vast property was adopted by the owners. It was comprehensive, practicable, correct. Of course it must take money to put it on a paying basis. A fine stream of water runs through the property. A natural site for a dam of less than 800 feet in length will form a lake nearly 2 miles long. The dam is nearly completed. Half a mile below the

its own lands and has a ready market for all its surplus. The mines now opened are about $3\frac{1}{2}$ miles from the site of the main reduction works by the road, not much more than 1 mile in a direct line, and the plan proposes a tunnel starting at the reduction works to be $\frac{1}{2}$ mile long, which will drain the mines and through which the ore will be sent to the reduction works. A large number of men and teams were employed on the dam, which, as I have said, is nearly finished. An immense solid and costly foundation for the main reduc-

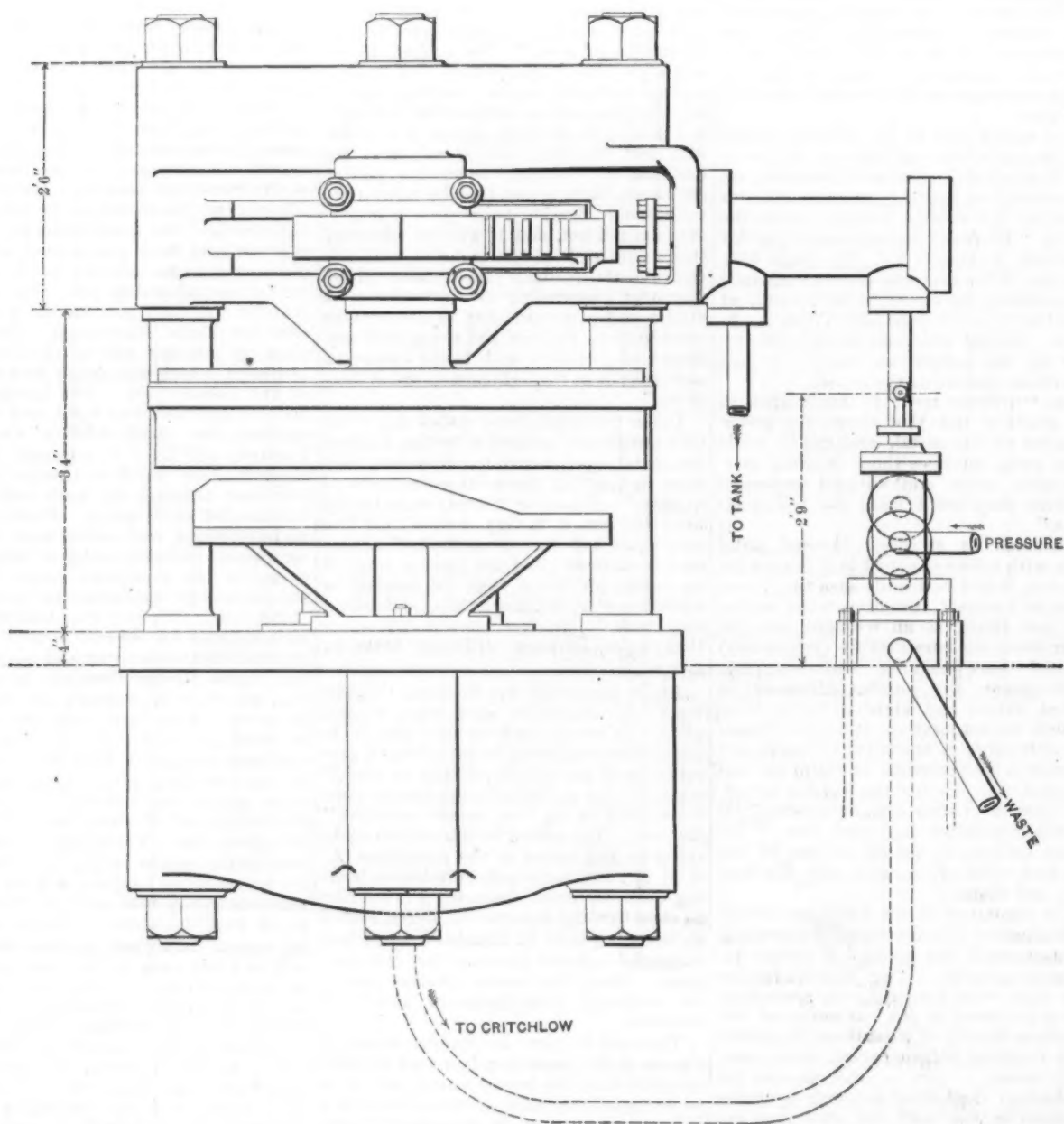


Fig. 1.—Elevation.

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dam are the foundations for the large reduction works; the fall between the dam and reduction works is 60 feet. The water power thus acquired will run all the machinery that may ever be required. It is not necessary to argue with practical men as to the inestimable value of this cheap power, especially in California; but below the dam and reduction works lie thousands of acres of this ranch, now comparatively valueless, but with the water put on it worth from \$150 to \$250 per acre. Thus, after using the power to run the reduction works the same power is sold at an immense price. The estate has five times the amount of water required for irrigating

tion works is finished. At the mines' a number of substantial buildings were erected. The ledge here for a long distance stands out above the surface of the country; two shafts were started down on the ledge and two first-class hoisting works were erected; two tunnels begun. A small test mill with a common five-stamp battery was erected to test and experiment with the ore, to ascertain the best method of reduction, for this was a new industry in this country. A new style of furnace for reducing the cassiterites and which uses crude oil for fuel was erected. Two different patterns of concentrators were put in and other patterns ordered. The whole

purpose of this test mill was to determine by actual experiment the best method of reducing the ore, the best pattern of concentrator, and the kind of machinery to be put in the main works, and was never intended for anything else. This five-stamp battery in this experimental mill has a capacity of from 5 to 7 tons of ore per day. The one furnace can in three days reduce to pig tin all the cassiterites the battery can furnish in a month.

The first pigs of tin were produced April 25, 1891, at this test mill, and within the following 65 days, or up to July 1, 1891, about 12 tons of pig tin were produced. This was the condition of things when the management was changed and the com-

Many tons of ore are on the dump ready for the battery. Near it six concentrators are being put in place—two True pattern two Triumph, one Woodbury (the inventor of which, George E. Woodbury of San Francisco, we found superintending the work of placing his machine in position. He is also the inventor of the Triumph) and one Paradox, the invention of George M. Grose of Chicago, and who is to be at the mines this week to look after the work of his machine. It is expected that the concentrators will be ready and the new mill running within seven days, when 45 tons of ore will be worked by the two mills each day. The machinery for two more of these steam batteries is at the mines and

ported from below by tubular separators E. F is the mold wheel, made in circular form and arranged to rotate on the bolt G as an axis. It carries a series of mold matrices, H, bolted to the mold wheel. The base of the hub of the mold wheel rests upon the surface of a frame, at the periphery of which is bolted a block I. The latter is formed in the segment of a circle whose center is the bolt G, and serves as a guide for the plungers. These plungers are simple blocks made substantially of the same cross-sections as the matrices which they fit, their bases projecting below the mold wheel and resting on the surface of the guide. The guide I is not a complete circle in peripheral outline, but the com-

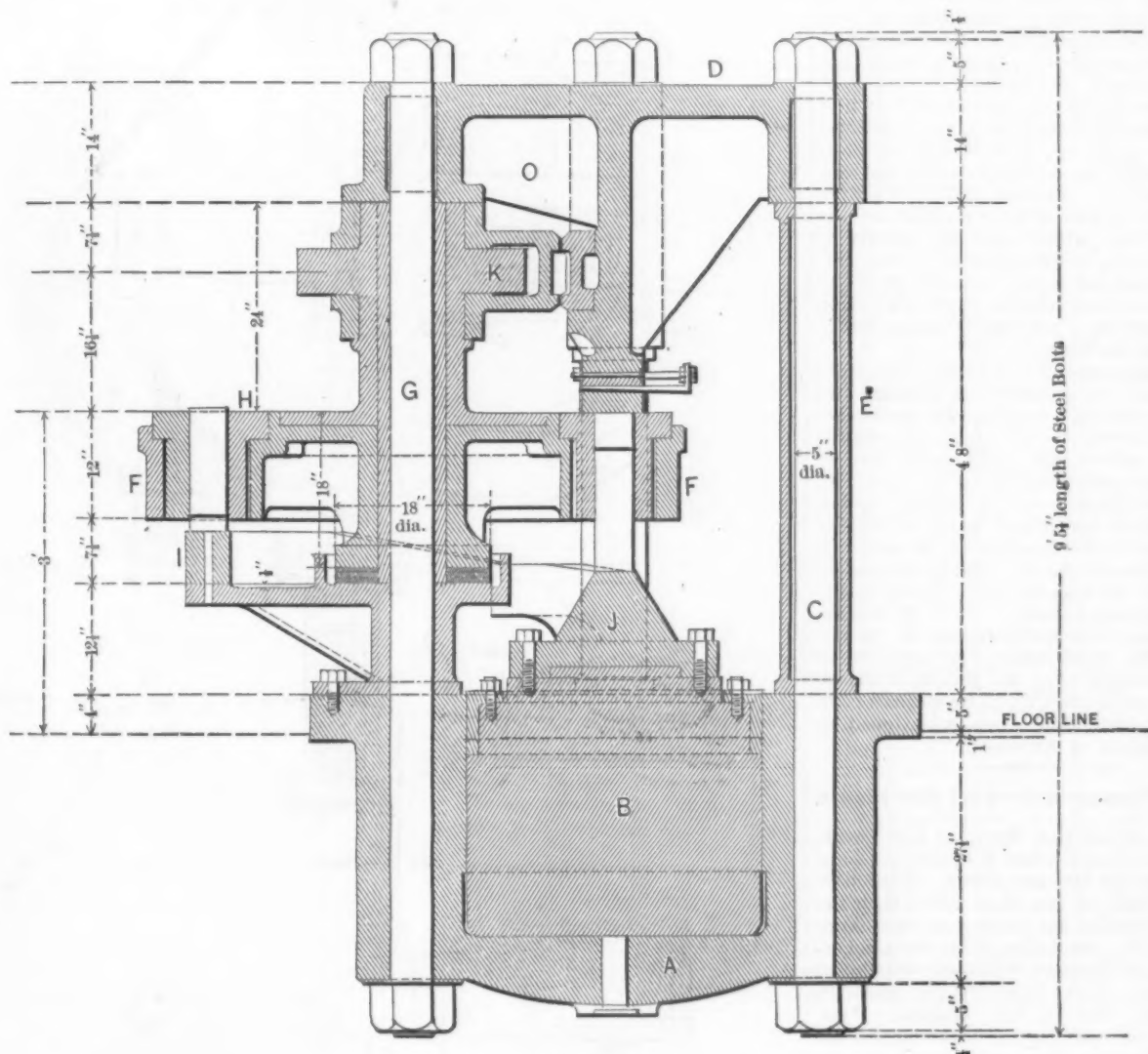


Fig. 2.—Vertical Section.

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pany had expended over \$500,000. Work on the dam and on the large reduction works was stopped and the new superintendent, Mr. Harris, one of the most expert tin-mine managers in England, set to work to produce enough tin to convince the stockholders of the value of their property. We found on our arrival at the mines on Monday last 100 men at work. The five-stamp battery was running, crushing ore, as it has been continuously since it was first set at work, with the exception of a few days for repairs. We found a new steam stamp mill of the latest pattern, which is set up at the upper shaft, constructed wholly of iron and steel, that was made at Hayle, Cornwall, by Hervey & Co. in the year 1890, as the castings say for themselves. The capacity of this mill is 40 tons of ore per day. It was tested the day before we arrived, working perfectly.

will be erected as soon as possible. The three are capable of working 120 tons of ore per day. Fifty miners are at work in the shafts and tunnels and 50 more men above ground running the machinery and on new buildings, and additions to the force are made as fast as possible.

The Aiken Press for Basic Brick.

The general design and details of the Aiken press are clearly shown in the accompanying illustrations, Fig. 1 representing a general elevation, Fig. 2 a vertical section, Fig. 3 a plan and Fig. 4 details. The framework of the press consists of the upright rods C, five inches in diameter, which pass through wings of the cylinder A, and at their upper end are provided with a cap plate D, which is sup-

plete circle is made up by the hub piece of the ram J, from the head of which the path may be traced, partly in dotted lines, towards I in Fig. 2. It thus constitutes a circular track lower at the point of the ram but higher at I. The bases of the plungers travel on this track during the rotation of the mold wheel, and by the inclination automatically effect the elevation of the matrix-plungers to eject the compressed and molded bricks and permit their descent to enable fresh material to be charged into the matrices. Fig. 4 more clearly shows this part of the design. The part *d e* on the ram head is inclined, *e f* is level, *f g* again is inclined and *g h* level. The operation of the machine may be described as follows: When one of the matrices in the mold wheel is directly above the ram J, Fig. 2, pressure is admitted into the cylinder A, elevating the

ram and the mold plunger above it, compressing the basic material in the matrix against the block shown above it. The ram is then withdrawn by releasing the pressure and the mold wheel turned through a sixth of a revolution, so as to carry the matrix under consideration into the position shown at m^1 , Fig. 3. In this motion the plunger passes over the inclined portion $d e$ of the track, partially ejecting the compressed brick. The ejection of the brick may be aided further by raising the hydraulic ram slightly after the mold has passed the position m , Fig. 3, an expedient which is frequently necessary when a great pressure causes the brick to stick in the mold. The mold wheel remains at rest until another brick is pressed, and then a second sixth revolution carries the matrix portion mentioned into the position m^2 , Fig. 3, when the plunger rests on the inclined $f g$ in Fig. 4. A further partial revolution brings it into the position m^3 , when the plunger is lifted in a flat position, $g h$, to its highest position, so that the brick is ejected and can be removed. Another sixth revolution brings the matrix into the position m^4 , the lowest from which also the matrix is charged with brick material. Two further revolutions carry it into the positions m^5 and m consecutively, thus completing a circle of the mold wheel, during which six bricks are formed.

The apparatus for rotating the mold wheel may be described as follows, with special reference to Fig. 3: A ratchet wheel, shown in the plan as rotating around one of the main bolts, has six teeth and is operated by the pawl M , which is carried on an annular collar. This ratchet is operated by the rotation of its collar in the direction of the arrow N , the rotation of the collar being effected by means of the rack O , driven by the piston P of a power cylinder. In order that the bricks may be properly formed by the machine, the block above the mold wheel against which they are pressed is adjustable, as shown in Fig. 2, by means of the wedge plate. The press is designed by Henry Aiken of Pittsburgh.

Large Contracts for Fuel Gas Plants.

Wm. Swindell & Bros. of Pittsburgh, Pa., have just finished a number of large contracts for fuel gas plants. They have constructed no less than 103 of their improved circular gas producers since April 1, 1891, in connection with their regenerative gas furnaces, which are distributed as follows: Forty improved gas producers for Park, Bro. & Co., Limited, Pittsburgh, Pa., making one of the largest and most complete fuel gas plants in the country. These producers are to supply gas for the crucible and open-hearth departments of the Black Diamond Steel Works at Pittsburgh. The new tube welding plant of the Oil Well Supply Company at Pittsburgh was constructed by this firm. It consists of two top welding, two bending, two bell, two tagging and one socket furnaces. These furnaces are supplied with fuel by 20 circular gas producers. The plant has been in successful operation for two months. They also constructed the two large Siemens heating furnaces, five sheet furnaces and six gas producers at the W. D. Wood Company's works, McKeesport, Pa. The sheet furnaces are run by manufactured gas direct, which is entirely new practice, and the application of the gas in this way greatly reduces the cost of construction when compared with a regenerative gas furnace. The design for this furnace has been patented by Wm. Swindell.

The Spang Steel and Iron Company have given them a contract for 18 gas producers and 500 feet of 6 foot gas flues, with connections to furnaces; Wm. Clark, Son & Co., Pittsburgh, for two Swindell

heating furnaces and four gas producers; Montreal Rolling Mill Company, Montreal, Canada, one large Siemens heating furnace, making the ninth order from this firm; U. S. Projectile Company, Brooklyn, N. Y., one Siemens heating furnace and two gas producers; Pittsburgh Forge and Iron Company, Pittsburgh, two Swindell heating furnaces and three gas producers; Atkinson Steel and Spring Company, Harvey, Ill., one 10-ton open-hearth furnace and two gas producers; Johnson Company, Johnstown, Pa., one 5-ton open-

Hamilton & Co., Pittsburgh, one gas producer. This producer is supplying gas to a 10-pot glass melting furnace. The gas is applied direct to the furnace by an improved method recently patented by Wm. Swindell. This method can be applied to any of the common glass melting furnaces at a very small cost, and the successful working of it has been demonstrated at the above works. They have also remodeled three circular gas producers that were recently built by other parties for the Tyrone Iron Company,

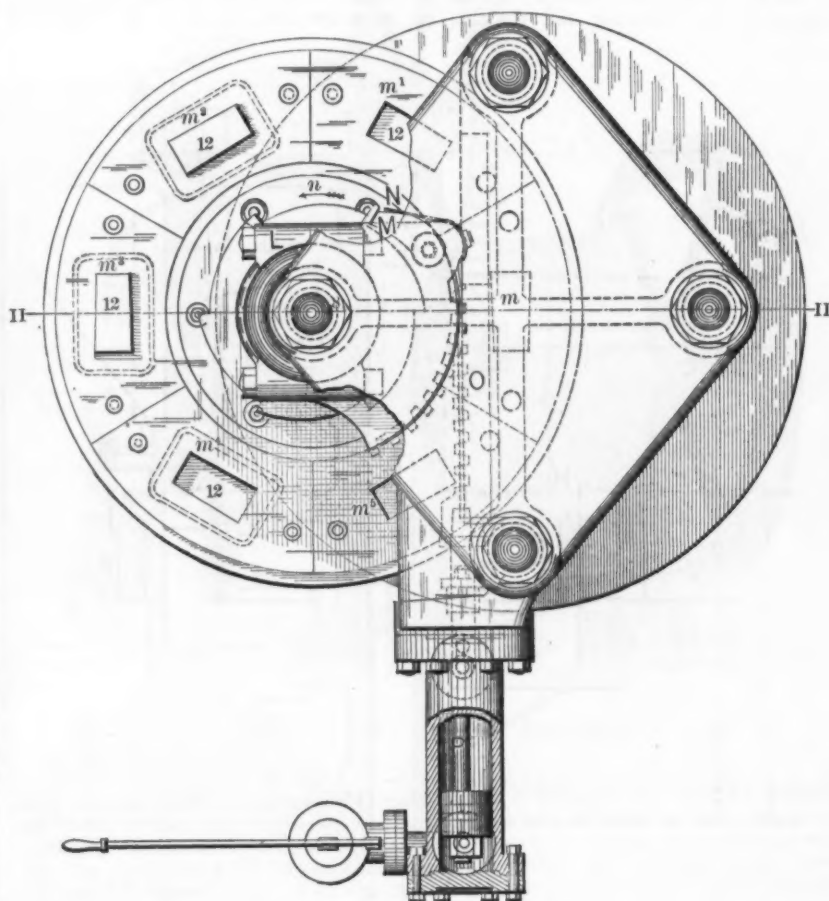


Fig. 3.—Plan.

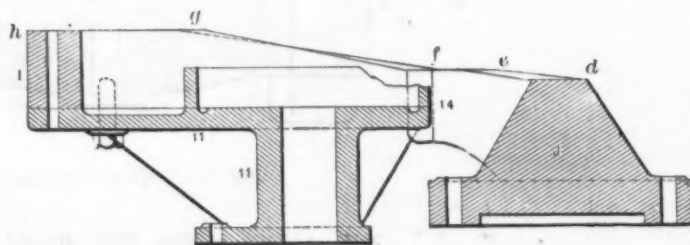


Fig. 4.—Track.

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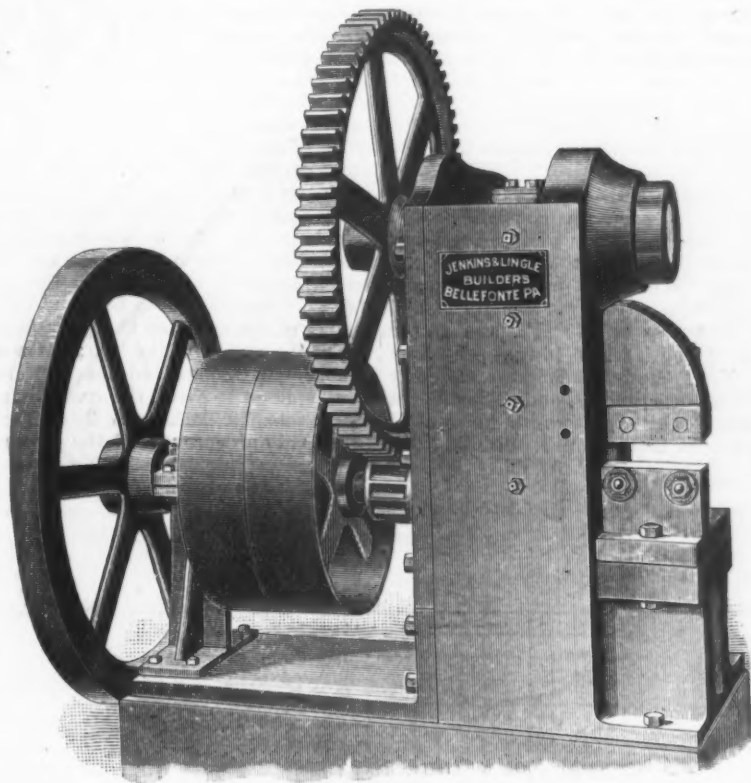
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Sale of a Milwaukee Shipyard.

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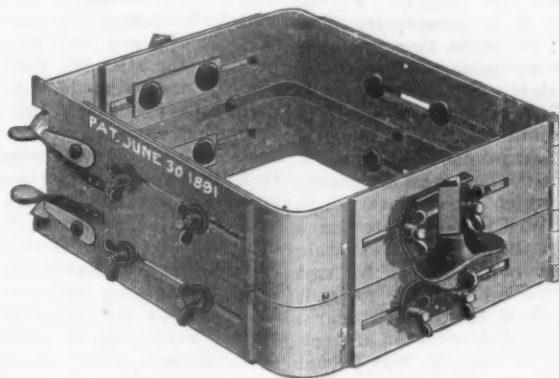
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ram and the mold plunger above it, compressing the basic material in the matrix against the block shown above it. The ram is then withdrawn by releasing the pressure and the mold wheel turned through a sixth of a revolution, so as to carry the matrix under consideration into the position shown at m^1 , Fig. 3. In this motion the plunger passes over the inclined portion $d e$ of the track, partially ejecting the compressed brick. The ejection of the brick may be aided further by raising the hydraulic ram slightly after the mold has passed the position m , Fig. 3, an expedient which is frequently necessary when a great pressure causes the brick to stick in the mold. The mold wheel remains at rest until another brick is pressed, and then a second sixth revolution carries the matrix portion mentioned into the position m^2 , Fig. 3, when the plunger rests on the inclined $f g$ in Fig. 4. A further partial revolution brings it into the position m^3 , when the plunger is lifted in a flat position, $g h$, to its highest position, so that the brick is ejected and can be removed. Another sixth revolution brings the matrix into the position m^4 , the lowest from which also the matrix is charged with brick material. Two further revolutions carry it into the positions m^5 and m consecutively, thus completing a circle of the mold wheel, during which six bricks are formed.

The apparatus for rotating the mold wheel may be described as follows, with special reference to Fig. 3: A ratchet wheel, shown in the plan as rotating around one of the main bolts, has six teeth and is operated by the pawl M , which is carried on an annular collar. This ratchet is operated by the rotation of its collar in the direction of the arrow N , the rotation of the collar being effected by means of the rack O , driven by the piston P of a power cylinder. In order that the bricks may be properly formed by the machine, the block above the mold wheel against which they are pressed is adjustable, as shown in Fig. 2, by means of the wedge plate. The press is designed by Henry Aiken of Pittsburgh.

Large Contracts for Fuel Gas Plants.

Wm. Swindell & Bros. of Pittsburgh, Pa., have just finished a number of large contracts for fuel gas plants. They have constructed no less than 103 of their improved circular gas producers since April 1, 1891, in connection with their regenerative gas furnaces, which are distributed as follows: Forty improved gas producers for Park, Bro. & Co., Limited, Pittsburgh, Pa., making one of the largest and most complete fuel gas plants in the country. These producers are to supply gas for the crucible and open-hearth departments of the Black Diamond Steel Works at Pittsburgh. The new tube welding plant of the Oil Well Supply Company at Pittsburgh was constructed by this firm. It consists of two top welding, two bending, two bell, two tagging and one socket furnaces. These furnaces are supplied with fuel by 20 circular gas producers. The plant has been in successful operation for two months. They also constructed the two large Siemens heating furnaces, five sheet furnaces and six gas producers at the W. D. Wood Company's works, McKeesport, Pa. The sheet furnaces are run by manufactured gas direct, which is entirely new practice, and the application of the gas in this way greatly reduces the cost of construction when compared with a regenerative gas furnace. The design for this furnace has been patented by Wm. Swindell.

The Spang Steel and Iron Company have given them a contract for 18 gas producers and 500 feet of 6 foot gas flues, with connections to furnaces; Wm. Clark, Son & Co., Pittsburgh, for two Swindell

heating furnaces and four gas producers; Montreal Rolling Mill Company, Montreal, Canada, one large Siemens heating furnace, making the ninth order from this firm; U. S. Projectile Company, Brooklyn, N. Y., one Siemens heating furnace and two gas producers; Pittsburgh Forge and Iron Company, Pittsburgh, two Swindell heating furnaces and three gas producers; Atkinson Steel and Spring Company, Harvey, Ill., one 10-ton open-hearth furnace and two gas producers; Johnson Company, Johnstown, Pa., one 5-ton open-

Hamilton & Co., Pittsburgh, one gas producer. This producer is supplying gas to a 10-pot glass melting furnace. The gas is applied direct to the furnace by an improved method recently patented by Wm. Swindell. This method can be applied to any of the common glass melting furnaces at a very small cost, and the successful working of it has been demonstrated at the above works. They have also remodeled three circular gas producers that were recently built by other parties for the Tyrone Iron Company,

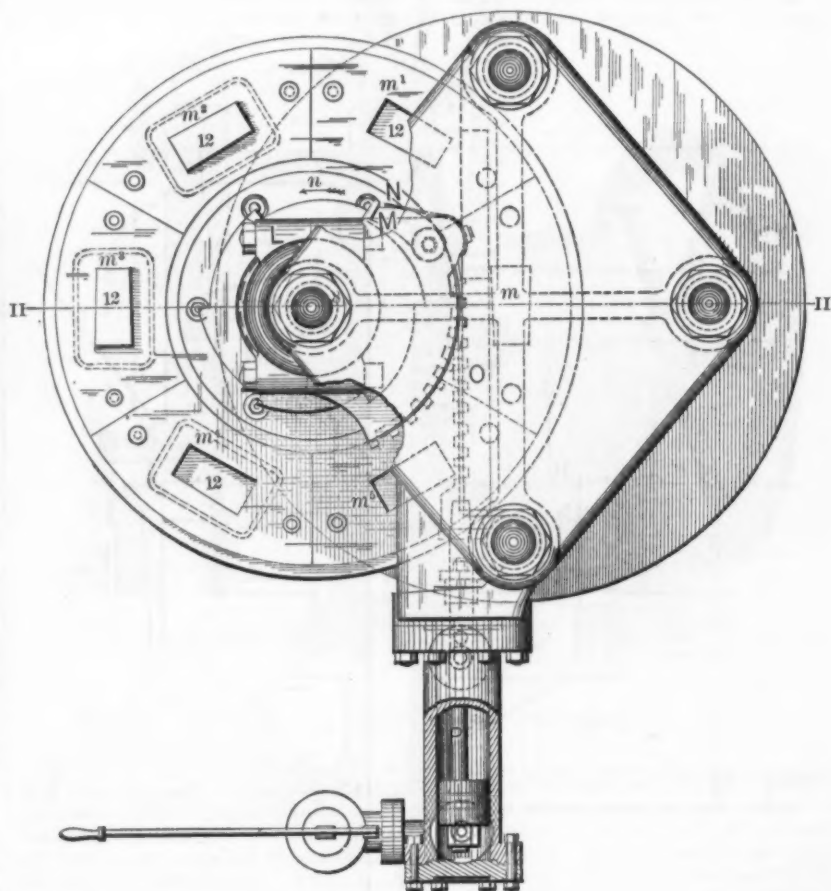


Fig. 3.—Plan.

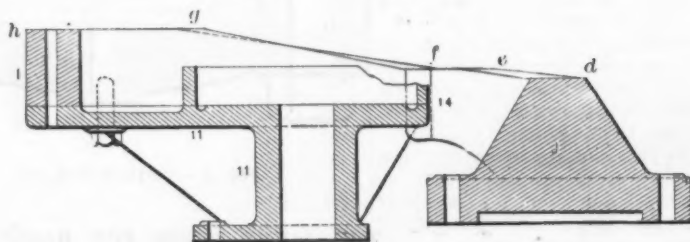


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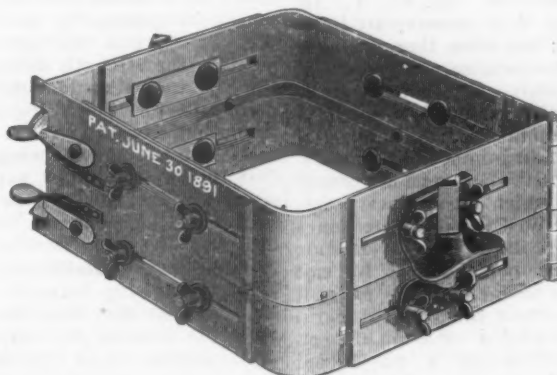
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Fire-Proof Construction.

BY JOHN JAMES WEBSTER.

The following paper, read before the Institution of Civil Engineers, is a description of the various fire-proof systems adopted in England and other countries:

There is, of course, no such thing as a fire-proof structure, if the phrase be taken in a strictly literal sense, no known substance being able to resist a change of state when submitted to the action of intense heat. In the present paper it is intended that the words "fire proof" shall apply to any materials or combination of materials which have been designed to resist the action of fire; whether successfully or not is immaterial. A comparison between various structures or materials can thus be instituted, and one can be described as being more or less fire proof than another.

There is evidence that from the earliest times attempts were made to protect buildings from fire, and also that various fire-extinguishing appliances were used; but probably the massive stone and brick walls, and columns with groined roofs, and the cemented tile and brick floors and roofs of the Romans were designed rather for the sake of architectural effect than from a desire to make the buildings fire proof.

The subject may be conveniently considered under the following heads:

1. The fire-resisting properties of the various materials used.
2. The structural combination of materials.
3. The general arrangement of the structures.

All these considerations are of importance, and it is the combination of the various conditions which determines the extent to which a structure is fire proof.

Fire-Resisting Properties of the various Materials used.

The materials generally employed in fire-proof construction are (a) cast iron, wrought iron and steel; (b) stone; (c) brick; (d) concrete; (e) terra cotta; (f) plaster; (g) timber; (h) asbestos and silicate cotton. The properties of these materials in their simple state will be first considered, and their value when forming part of a fire-proof structure will be dealt with subsequently.

CAST IRON, WROUGHT IRON AND STEEL.

The properties of these metals at a normal temperature of, say, 60° F. are well known, and it is unnecessary to recapitulate them; but when they are submitted to high temperatures the results of experiments by eminent authorities are so conflicting that it is somewhat difficult to form a definite opinion. The number of experiments on cast iron at high temperatures is very limited, there is no uniformity in the results, which are in most cases anomalous. Sir W. Fairbairn stated in a paper read before the British Association in 1837 that it was not necessary for cast iron to reach the fusing point to cause it to give way; and that the loss of strength in cold-blast iron in a variation of temperatures from 26° to 190° F. was 10 per cent., and in hot-blast iron from 21° to 190° F. 15 per cent.

On another occasion he stated that "There is not, however, any great difference in the bearing power of cast iron between the freezing point and when raised to 600°; but there is a sensible diminution of strength when the temperature exceeds that point, or when the bar becomes perceptibly red hot in the daylight." Again when giving evidence before the Royal Commissioners, he said that "On the whole, we may infer that cast iron of an average

quality loses strength when heated beyond a mean temperature of 220° F." The experiments from which the foregoing contrary conclusions were drawn were of such a limited and unsatisfactory nature that it is impossible to attach much scientific value to the results recorded. The investigations of wrought iron and steel under similar conditions have been much more extensive, and, although there is a great diversity of opinion among the authorities, it is possible to form a general idea of the behavior of these metals when submitted to high temperatures. Sir W. Fairbairn appears to have been one of the earliest to investigate this subject, and in a paper read before the British Association at Cheltenham in 1856 he stated that with plate iron there was no well marked effect of temperature until a dull red heat was approached, when the tenacity rapidly decreased. With rivet iron the strength increased from 28 tons per square inch at 60° to 38.4 tons at 435° F., and at red heat the strength fell to 16 tons per square inch. Knut Styffe made some carefully conducted experiments, and came to the conclusion that the strength of steel at temperatures between 212° and 392° F.

tensile strength, and the horizontal figures give the temperatures in degrees Fahrenheit.

The rate of expansion of iron increases with the temperature, but for practical purposes it may be considered that a bar 10 feet long, exposed to the fierce heat of a conflagration, which often exceeds 2000° F., would expand nearly 1½ inch. As the force of expansion is equal to the amount necessary to compress the metal to an equal extent, it is an easy matter to calculate the enormous force which is developed either in the expansion of a bar by heat or in its contraction when cooling. The effect of quenching with water either iron or steel when red hot depends entirely upon the form of the test piece and upon whether it is under the action of any external stresses. If the piece is perfectly homogeneous and symmetrical, and heated and quenched uniformly, nothing will happen beyond the alteration of the temper of the steel and the possible chilling of the surface of the iron; if the metal is not homogeneous and the cast iron be at all spongy in parts, the quenching will most probably cause it to fly into pieces, principally on account of the steam gen-

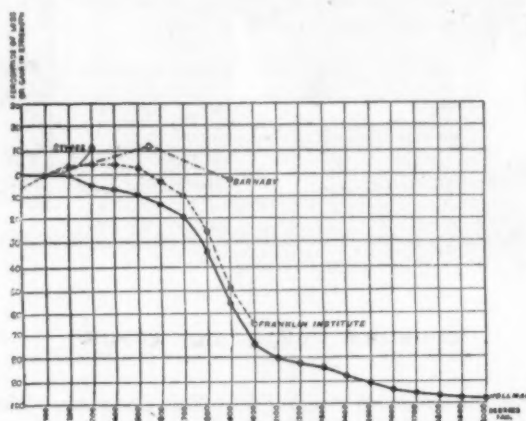


Fig. 1.—Diagram Showing Strength of Bar at Different Temperatures.

was the same as at the ordinary temperature; but that the strength of wrought iron was greater. C. Huston tested iron and steel at the ordinary temperature, at 572° F. and 932° F., and found that there was a gain of tensile strength, but a decrease of elongation with a rise of temperature. Mr. Barba found that steel at 400° F. had an increase of strength of 30 per cent., and a decrease of elongation of 30°; that the temperature of maximum strength was 572° F., and that beyond that temperature the strength decreased rapidly. Sir N. Barnaby made some valuable experiments for the Admiralty upon the strength of iron and steel at high temperatures; the test pieces being much larger than those in the former experiments, the results are likely to be more accurate. He found that the maximum tensile strength of B.B. boiler iron, Bowling iron, Bessemer and Siemens-Martin steel was at temperatures ranging between 490° and 550° F., and that the elongation diminished with the increase of temperature. The most elaborate set of experiments appears to be that of Dr. J. Kollmann. He found a gradual decrease in the tensile strength of the iron bars from 32° F. to the higher temperatures. A number of carefully conducted experiments was made for the Franklin Institute, which corroborated to a great extent the results obtained by Kollmann.

In Fig. 1 the percentage of increase or decrease at various temperatures of the tensile strength of the original bar at 60° F. has been plotted. The vertical column shows the percentages of loss or gain of

erated in the crevices. But if it forms part of a structure the conditions are entirely different. If a simple riveted plate girder without any load is heated and cooled, either suddenly or otherwise, it will not return to its original form, on account of the internal stresses set up in the various operations during construction. If the girder or column is loaded unequally, or is in any way constrained, it will neither expand uniformly with red heat nor return to its original form or position when cooling. The extent of the distortions depends, of course, entirely upon the conditions referred to; beams and columns of wrought iron and steel may be twisted out of all shape, and if of cast iron may be fractured with cooling.

STONE.

Although stone is an admirable material to use for constructional and architectural purposes, it does not resist the action of fierce heat so well as might be imagined, and very soon either cracks, shells or calcines, according to the nature of the material. After the great fires at Chicago, at Boston, and at Paris, during the Commune, it was noticed that the limestones were calcined, the fronts of buildings in many cases being entirely burnt away, leaving the brick backing standing several floors in height. The granite sometimes exploded, flying off in fragments, or slowly disintegrated to a fine sand, and where the heat was not very intense, merely cracked and scaled off. The sandstones stood the heat best, on account of the large amount of silica in the composi-

tion; but it was simply a question of time, for in many cases they were either cracked or disintegrated. The same results have been observed by the author after many of the large fires in London, Manchester, Liverpool and elsewhere. To form an approximate idea of the comparative capabilities of the different stones to resist intense heat, the author made a number of experiments, in which he was assisted by Thomas Morris, works manager of Dallam Forge, Warrington. Cubes of the following stones were obtained:

1. Syenite from North Wales, used more for paving setts than for building purposes.

2. A porphyritic granite, containing large crystals of feldspar, from the quarries in Westmoreland, largely employed for building purposes.

3. A carboniferous limestone resembling marble, from the Derbyshire quarries, compact and fine grained, used for building purposes.

4. Portland oolite.

5. Sandstone grit from Darley Dale, Derbyshire.

6. Sandstone grit from Bramley Fall, Yorkshire.

The above samples were in rough cubes, having about 5-inch sides, with the exception of the Welsh syenite, which had 4-inch sides only. They were arranged

to split up and crumble, the small pieces becoming calcined. The Portland stone stood apparently intact for about three minutes, but a slight tap with an iron rod broke it into pieces, which commenced to calcine. The Darley Dale and the Bramley Fall stones stood the heat intact for about four minutes, when they commenced to scale and shell off. A small crack appeared in the Bramley Fall stone in about two minutes, but the other part remained firm for about four minutes. The stones were withdrawn at the end of about nine and one-quarter minutes, although their natural properties had been destroyed fully five minutes before. The above tests were no doubt very severe, for in the first place it would be impossible for the six sides of a stone in an ordinary structure to be exposed simultaneously to heat, and in the next place the stones were comparatively small and the intense heat was applied suddenly. The experiments, however, showed conclusively that granites are the least and sandstones the most refractory of the stones, but that none of them possess the property to a high degree, fully indorsing the opinions formed after the great fires referred to. It was intended to quench the stones with water upon their removal from the furnace, but the heat alone had been sufficient to destroy them.

amount of expansion of a bar of iron under similar circumstances. The average weight required to crush a Stourbridge fire brick is about 50 tons applied to the flat side of a brick 9.08 inches long by 4.4 inches broad by 2.47 inches thick, which is equivalent to 1.3 ton per square inch.

CONCRETE.

Many of the fire-proof floors are now constructed of concrete of various materials, either in the form of arches or with flat ceilings, built *in situ* or in slabs. The details of the various systems will be fully described in Section 2. Although a certain material may withstand the action of fire satisfactorily, it is important to know what will be the effect upon it of water when in a heated state, for in a conflagration these two elements have to be contended with, and very often water causes the more disastrous effects. It may be mentioned that at the great fire at Lynn on November 26, 1889, when buildings covering an area of 40 acres were destroyed, the water used would have flooded the whole space to a depth of over 7 feet; and at the great fire at Boston on November 28, 1889, sufficient water was poured upon the structures to cover the site to a depth of 12 feet 7 inches.

To enable some idea to be formed of the action of fire and water upon various con-

Table I.—Composition of Fire-Clays and Bricks.

Name of brick or clay.	Silica.	Alumina.	Lime.	Magnesia.	Sesquioxide of iron.	Potash.	Soda.	Titanic acid.	Quartz.	Water combined.	Water combined and hygroscopic.	Total.	Authority.
Dowlais, South Wales.	63.09	29.09	0.42	0.66	2.88	1.92	0.31	2.21	.....	.....	.....	100.58	Riley.
Windsor brick.....	84.65	8.85	1.90	0.35	4.25	.....	.....	.....	.....	.....	.....	100.0	Richardson.
Lee Moor.....	75.04	21.25	1.95	0.41	0.37	0.83	0.09	.....	.....	.....	.....	99.94	Abel.
Buckley, Flintshire.....	88.1	4.5	1.2	.....	6.1	.....	.....	.....	.....	.....	.....	99.9	Napier.
Dinas clay.....	98.31	0.72	0.22	.....	0.18	.....	0.14	.....	.....	0.35	.....	99.92	Weston.
And organic matter.													
Stourbridge clay.....	63.30	23.30	0.73	.....	1.80	.....	.....	.....	.....	.....	10.30	99.43	Tookey.
Pioneer, Raritan, New York clay.....	37.85	36.75	.....	Trace.	0.95	0.37	.....	1.6	10.5	12.3	1.00	100.32	Cook.

about 5 inches apart in a row, upon a wrought-iron plate, and placed diagonally across the floor of a large heating furnace, each stone thus receiving the same amount of heat simultaneously. The temperature of the furnace when they were first inserted was not taken by means of a pyrometer, but judging from the color of the sides and bottom it was about 2400° F. It gradually cooled down to about 2000° F., when they were removed, nine and one-quarter minutes afterward.

According to the experiments of Pouillet, made with an air thermometer having a platinum bulb, the following are the colors corresponding to the various temperatures:

	Degrees Centigrade.	Degrees Fahrenheit.
Dull red.....	700	1,292
Incipient cherry red.....	800	1,473
Cherry red.....	900	1,652
Clear cherry red..	1,000	1,832
Deep orange.....	1,100	2,012
Clear orange.....	1,200	2,192
White.....	1,300	2,372
Bright white.....	1,400	2,552
Dazzling white....	1,500 to 1,600	2,732 to 2,912

The door of the furnace was left partly open to enable the action of the heat on the blocks to be seen. In one and one-quarter minutes the Welsh syenite cracked with a slight explosion and gradually broke into shelly fragments, most of which showed the usual conchoidal fractures. The Westmoreland granite was the next to fail, a large corner breaking off in one and one-half minutes; it afterward cracked and crumbled to small fragments. The limestone commenced to calcine at the corners, and in about two minutes began

BRICK.

The fire-resisting properties of brick have been fully demonstrated in the many conflagrations in this and other countries. When almost every other material had perished the brick work remained intact. This property depends chiefly upon the amount and proportion of silica and alumina contained in the clay from which the brick is made, and also upon the amounts of oxide of iron, lime, magnesia, potash, water, &c., which are present in small and varying quantities. The greater the proportion of alumina to silica, the greater is the infusibility of the clay, and an excess of oxide of iron and of the alkalis—which act as fluxes—renders it less refractory. It is the proper combination of the various constituents which makes special bricks suitable for particular requirements. Table I shows the composition of a few of the well-known fire clays and bricks, from analyses compiled from different authorities.

As the more refractory bricks are not so strong for constructional purposes, special combinations of the above materials are made to produce the blocks and bricks of the fire-proof floors described hereafter. Quenching the heated bricks with water does not appear to affect either their subsequent fire-resisting qualities or their strength, although in one or two cases when single heated bricks have been plunged into water cracks have developed. The expansion of fire brick due to the application of heat is 0.000002349 for 1° F. Therefore a 10-foot length of floor or wall raised to a temperature of 2000° F. would expand 0.56 inch, or about one-third the

cretes, the author made a series of experiments upon test briquettes of various mixtures, as follows:

- 10 briquettes of neat cement
- 10 briquettes of one part cement, one part sand.
- 10 briquettes of one part cement, three parts sand.
- 10 briquettes of one part cement, five parts sand.
- 10 briquettes of one part cement, four parts iron works slag.
- 10 briquettes of one part cement, four parts broken fire brick.
- 10 briquettes of one part cement, four parts pumice stone.
- 10 briquettes of one part cement, four parts coke breeze.
- 10 briquettes of one part plaster of Paris, four parts pumice stone.
- 10 briquettes of one part plaster of Paris, four parts broken fire brick.
- 10 briquettes of one part plaster of Paris, two parts fire brick.
- 10 briquettes of one part plaster of Paris, two parts iron works slag.

The briquettes were of the form usually adopted for testing cement, and the tests were made in the Bailey cement-testing machine in the laboratory of University College, Liverpool. Professor H. S. Hele Shaw, M. Inst. C.E., having kindly placed the use of the machine at the author's disposal. As the stresses to which the various concretes are submitted in an actual structure are very similar to those met with in ordinary engineering works where cement is used, the author felt justified in only applying such a tensile test as is usually adopted in the case of cement. Five briquettes of each set were tested at a normal temperature of about 60° F.; the other five were carefully heated on the top of a specially built-up fire of coal and

coke until they were of a light red heat, the average time of exposure to the heat being about five minutes; they were then removed, and while hot were quenched with water. A large number of the briquettes lost all cohesive power after being quenched, and it was with difficulty that they were removed intact; as they could not in this state withstand any tensile strain, they were allowed to dry. After three days' exposure to the atmosphere of a warm room they partly regained cohesion, and were then tested. The details of the tests are given in the Appendix, and Table II is a summary of the results.

TERRA COTTA.

This material, when great strength is not required, is often used in fire-proof construction, especially in America, for partitions, ceilings, lining of columns, furring of walls, &c. It is made from a special clay found in several localities in England. The red clays contain about 8 or 10 per cent. of oxide of iron, which renders the operation of burning difficult; the shrinkage is also unequal and uncertain, but is partially overcome by mixing different clays and adding ground pottery, glass and sand, &c. A porous terra cotta

which it is stated will withstand the action, not only of heat, but of water also.

TIMBER.

As a material timber alone cannot well be termed fire resisting, but it is preferred by many to iron and brick work for the columns and beams of mills. It is contended that large logs will not burn through, but only become charred on the outside, thus leaving the inner part uninjured. It is, however, simply a question of time and of temperature, and if the ruins after a large conflagration are inspected, in some cases large wooden beams will be found intact with only the outside charred, but in others they will be found to be burnt away entirely, and very often both these conditions are found in one ruin, showing that the fire had been fiercer in one part than another. The advantage claimed for wooden construction is that the firemen can form a good idea of how long a floor will burn without giving way, and can, therefore, enter the burning building with more confidence. Of the classes of timber generally used for building purposes in this country oak is found to offer the greatest resistance to the action of fire, and the resistance of all timber is greater at the side than at the ends.

Many attempts have been made to render timber and light fabrics less combustible by coating or by injecting various solutions, the following being some of the most successful:

Professors Bonn and Denny of Ghent University recommend a concentrated solution of phosphate of ammonia, but as this is an expensive material cynide of potassium may be used. Sir William Burnett's plan is to immerse the timber for about two days for each inch of thickness in a solution containing 1 pound of chloride of zinc to 4 gallons of water. Sir Frederic Abel recommends the surface to be painted with alternate coats of silicate of soda and lime wash. Maugham's patent consisted of phosphate of ammonia and starch in the proportions of 480 grains of the former to 1 ounce of starch water. Delfosse submitted the timber to the action of steam, placed it in a vacuum to withdraw all moisture, and then admitted a solution of sulphuret of calcium; sulphate of iron was then added, and to make the timber still more incombustible an acid solution of borate of soda. The use of the latter was also patented by Gratton & Rowbotham. H. Ellis used soda or potash with silicate of either magnesia, lime or alumina and iron. A solution of tungstate of soda has also been recommended as being effective and of moderate cost. O'Connor proposed a solution of either sulphate and carbonate or chloride of magnesium combined with 10 per cent. of bromine. Fobacci proposed the following mixture: American potash, 22 pounds; alum with ammoniacal base, 44 pounds; oxide of manganese, 22 pounds; sulphuric acid at 60° F., 22 pounds; water, 55 pounds, the sulphuric acid to be added slowly after the other substances have been dissolved in a boiler. For rendering fabrics and theatrical scenery incombustible Messrs. Martin & Tisser of Paris have introduced the following: Sulphate of ammonia, 8 parts; boracic acid, 3 parts; borax, 17 parts; water, 100 parts. Sulphate of ammonia and gypsum have been used for the same purpose, and also the following composition: Boracic acid, 5 parts; sal ammoniac, 15 parts; potassic feldspar, 5 parts; gelatine, 1.5 parts; size, 5 parts; water, 100 parts. One of the later preparations is asbestos paint, which has been adopted in many places, and to the presence of which has been attributed the prevention of the spreading of several fires. Sir Frederick Bramwell, in his presidential address, stated that it was owing to the wooden structures of the International Exhibition having been coated

Table II.—Summary of Tests of Concrete Briquettes.

Number of table in Appendix.	Nature and proportions of materials in concrete briquettes.	Average weight per cubic foot.	Breaking weight per square inch at temperature of 60° F.	Breaking weight per square inch after being heated and quenched.	Average loss per cent. of original strength after heating and quenching.
		Pounds.	Pounds.	Pounds.	Per cent.
I.	Neat Portland cement.....	124.6	554.6	117.2	60.8
II.	1 part cement, 1 part sand.....	120.9	448.0	93.0	80.0
III.	1 part cement, 3 parts sand.....	111.2	100.8	18.7	81.4
IV.	1 part cement, 5 parts sand.....	109.7	74.6	15.0	79.8
V.	1 part cement, 4 parts iron furnace slag.....	163.03	108.1	23.06	69.3
VI.	1 part cement, 4 parts broken fire brick.....	95.04	84.4	30.5	50.9
VII.	1 part cement, 4 parts pumice stone.....	64.8	94.58	38.3	59.5
VIII.	1 part cement, 4 parts coke breeze.....	71.65	69.9	39.06	57.1
IX.	1 part plaster of paris, 4 parts broken fire brick.....	89.6	66.8	10.3	75.0
X.	1 part plaster of paris, 4 parts pumice stone.....	55.6	57.4	3.4	94.7
XI.	1 part plaster of paris, 2 parts furnace slag.....	148.0	223.3	6.9	96.8
XII.	1 part plaster of paris, 2 parts broken fire brick.....	106.9	167.5	15.7	90.0

None of the above proportions are those adopted by the maker of any particular flooring, but they are such as to yield a good concrete under ordinary conditions, and are sufficient to enable an opinion to be formed of the strength of certain materials in combination, and of their value in fire-proof construction. The quenching test was a severe one, for it is hardly possi-

ble made by H. Maurer & Son of New York which appears to be free from the foregoing disadvantages, while retaining its fire resisting properties. It is composed of clay and sawdust, or shavings, tan bark, charcoal, &c.; after being thoroughly mixed it is subjected to an intense heat which consumes all the combustible substances, leaving the brick porous. As this material admits of nails being readily driven into it, it is well adapted for partitions, ceilings, &c.

PLASTER.

The fire-resisting properties of calcined gypsum, commonly called plaster of paris, have long been known, the builders in Nottinghamshire and Derbyshire, where the stone is found in abundance, having used this material for flooring for nearly three centuries. Gypsum is a native hydrated sulphate of lime, the finest qualities being termed alabaster, and when transparent, selenite. Plaster of paris is made by gently calcining gypsum until nearly the whole of the moisture is expelled, and then grinding it. The plan adopted by the Nottinghamshire and other builders is to mix the coarse powder into a paste, and throw it on the top of the wooden joists, reeds or laths to the depth of 9 or 10 inches, when it a few hours it sets. Gypsum is the basis of most plasters, and has good fire-resisting properties, but if not protected or strengthened by wire or other methods subsequently described, it would fail under the action of water thrown upon it during a conflagration. There are several cements and plasters mixed with other materials which certainly increase their fire-resisting qualities. Among them may be mentioned those made by Messrs. Hitchens, Robinson & Co., the Cyanite Company, and by Allen & Merritt, the latter being an American invention, and consisting of silicate of magnesium mixed with powdered flint, caustic potash and silicate of soda, and

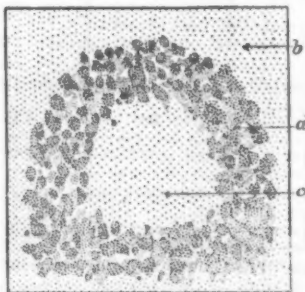


Fig. 2.—Full-Size Section of Briquette with Plaster-of-Paris as the Medium.

ble to have a floor heated to such an extent throughout and so quickly quenched as these small briquettes were; but although it may be contended that the conditions were not parallel with those obtaining in a building on fire, much can be learned by induction from the results. The face of the fracture of all the heated and quenched briquettes made with plaster of paris was very characteristic, and is shown in Fig. 2. The dark ring *a* was well marked, the outside *b* and the core *c* being whiter and much softer than the ring *a*; no plausible explanation of this formation has presented itself to the author. Many other concretes are used by different makers of fire-proof floors, some containing asbestos, silicate cotton, &c., but with these the author did not make any experiments.

with this paint that the whole building was not destroyed, the articles on one of the stalls having been completely consumed by fire, while the surrounding timber work was only charred beneath. In the public tests made in several large towns, when two wooden buildings exactly similar in construction were partly filled with wood and shavings soaked with petroleum and fired, that coated with asbestos paint successfully resisted the action of the fire, while the other was totally consumed. Although most of the above preparations are undoubtedly effective when first applied, it is a question as to

was intended that the certificate holders in the old company should receive shares in the new, and that \$3,000,000 in debenture bonds of the corporation should be issued. He contends that the effect of this proposed arrangement has been to depreciate the value of the certificates.

TORPEDOES.

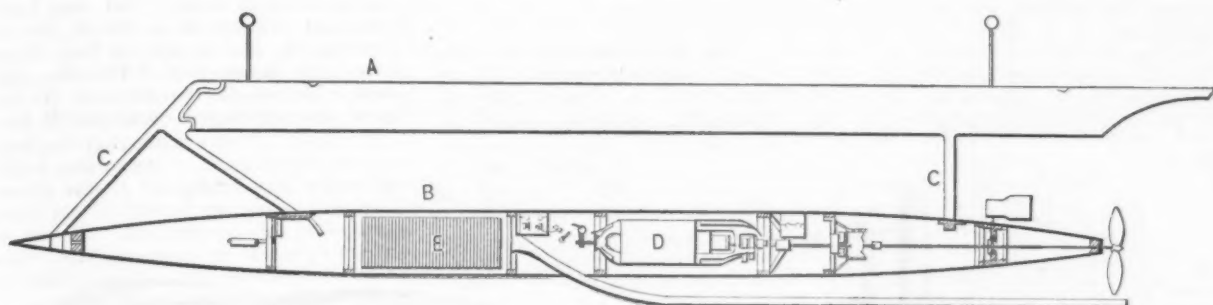
The Sims Electrical Torpedo.

This torpedo belongs to that class which are submerged or partially submerged in the water and which are propelled by an

ment is placed the explosive, the exploding device being of any suitable construction. The torpedo is steered by an electrical steering apparatus. It will be noted from the above general description that the torpedo is under the perfect control of the operator, who may be stationed at any convenient point. Its position is always known, and at the proper time the charge may be exploded.

The Howell Marine Torpedo.

The Howell marine torpedo differs very materially from the one just described. After it has been discharged it is beyond



THE SIMS ELECTRICALLY PROPELLED AND STEERED TORPEDO.

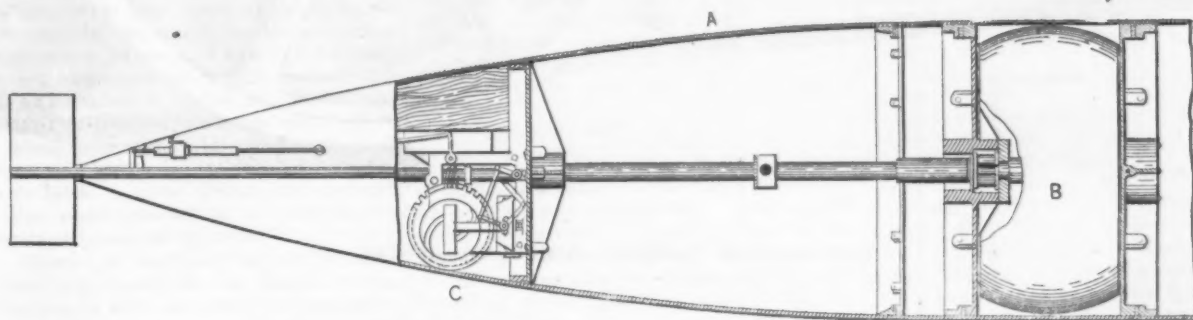
how long this property lasts, and constructional arrangements will, in most cases, make a second application of the solutions very difficult, if not impossible.

ASBESTOS AND SILICATE COTTON.

The fire-resisting properties of these materials are beyond dispute, and the advantage of their adoption in fire-proof construction is becoming more fully recognized. They are now to be obtained in convenient form; asbestos in either the loose fiber or in the form of cloth, mill-board, wall felt, &c.; silicate cotton or slag wool, in slabs of various thickness,

electric motor on the torpedo by means of a cable leading from the motor to a generator on the shore or on any suitable support external to the torpedo. The float A is in the shape of a boat and below it the torpedo is supported by the braces C, the forward one of which is made in the form of a knife edge in order that it may cut ropes or other such obstructions against which it may strike. The torpedo is made of a metal shell, preferably copper, and is nearly cylindrical in cross section. The float carries a number of signal balls supported on pivoted rods, which serve to indicate the position of the torpedo when

control. Power for driving the propeller is furnished by a heavy steel fly-wheel B, to which a high speed—some 20,000 turns per minute—is imparted. Successful experiments to attain this great speed have been made with the Dow steam turbine, which has been described and fully illustrated in former issues of *The Iron Age*. The fly-wheel is mounted on an axle which lies in the longitudinal axis of the torpedo. This axle is supported in suitable roller-bearings, fixed in place in the frame-work which supports the central section of the torpedo. The friction of the fly-wheel axle and shaft in their bearings tends to re-



THE HOWELL MARINE TORPEDO.

with or without wire netting, and in the loose fiber for filling intermediate spaces in doors, floors, partitions, roofs, &c.

(To be continued.)

Action has been commenced in the Supreme Court Chambers, in this city, to prevent the reorganization of the Lead Trust in New Jersey. The principal plaintiff in the case alleged that the trust was formed in October, 1887, capitalized at \$89,447,600, and was to continue 21 years. Last year it earned \$2,000,000. It appears its assets are worth only about \$25,000,000. Last August at a meeting of the certificate holders it was decided to transfer the assets to the new corporation to be formed in New Jersey with a capital of \$30,000,000. It was decided that the president and trustees should constitute a board of "reorganization trustees." It

the rest is entirely submerged. Should the torpedo strike an obstruction when under way the knife-edge brace would cause it to sink still further into the water and the torpedo would pass under the obstruction, the signal balls turning on their pivoted rods to permit the free passage of the torpedo.

The electric motor D is arranged to drive the propeller. The cable connecting the motor with the generator is stored in the compartment B. It is uncoiled as the torpedo moves away from the shore. The cable carries two conductors, one being comparatively small and formed of several fine wires twisted together and surrounded by insulating material. The other is of greater capacity, and consists of a larger number of fine wires wound in long spirals around the insulated conductor, and being in turn covered with insulating material. In the forward compart-

ment the torpedo itself on its longitudinal axis in the same direction as the direction of the revolution of the fly-wheel. This tendency is counteracted by means of two vertical rudders, which, from the method and effect of their action, are called "helicoidal rudders." When acted upon by their mechanism they swing in opposite directions, and thus act only as a screw to roll the torpedo. Tests of both the Howell and Sims torpedoes are now being carried on by the Government in order to fully ascertain the capacities of each.

It is said that within the last three months from \$7,000,000 to \$8,000,000 of Mexican silver has been received in New York and London, in payment for merchandise bought in anticipation of the new Mexican tariff, which took effect November 1.

The Weston Tandem Compound Engine.

In a recent issue we described the automatic steam engine built by the Weston Engine Company of Painted Post, N. Y., with Julian Scholl & Co. of 40 Cortlandt street, New York, agents. We now illustrate the tandem compound.

As will be seen, the sub-base is made a part of the engine proper by extending it and projecting a neck in front of the high-pressure cylinder for the attachment of the low-pressure cylinder. This arrangement has several advantages, principal among which is the accessibility of the low-pressure cylinder for inspection. As leakage from this cylinder represents the most serious loss, it is obvious that the usual practice in tandem compounding of making the low-pressure cylinder practically inaccessible is claimed to be a mistake, as if no opportunity is given for

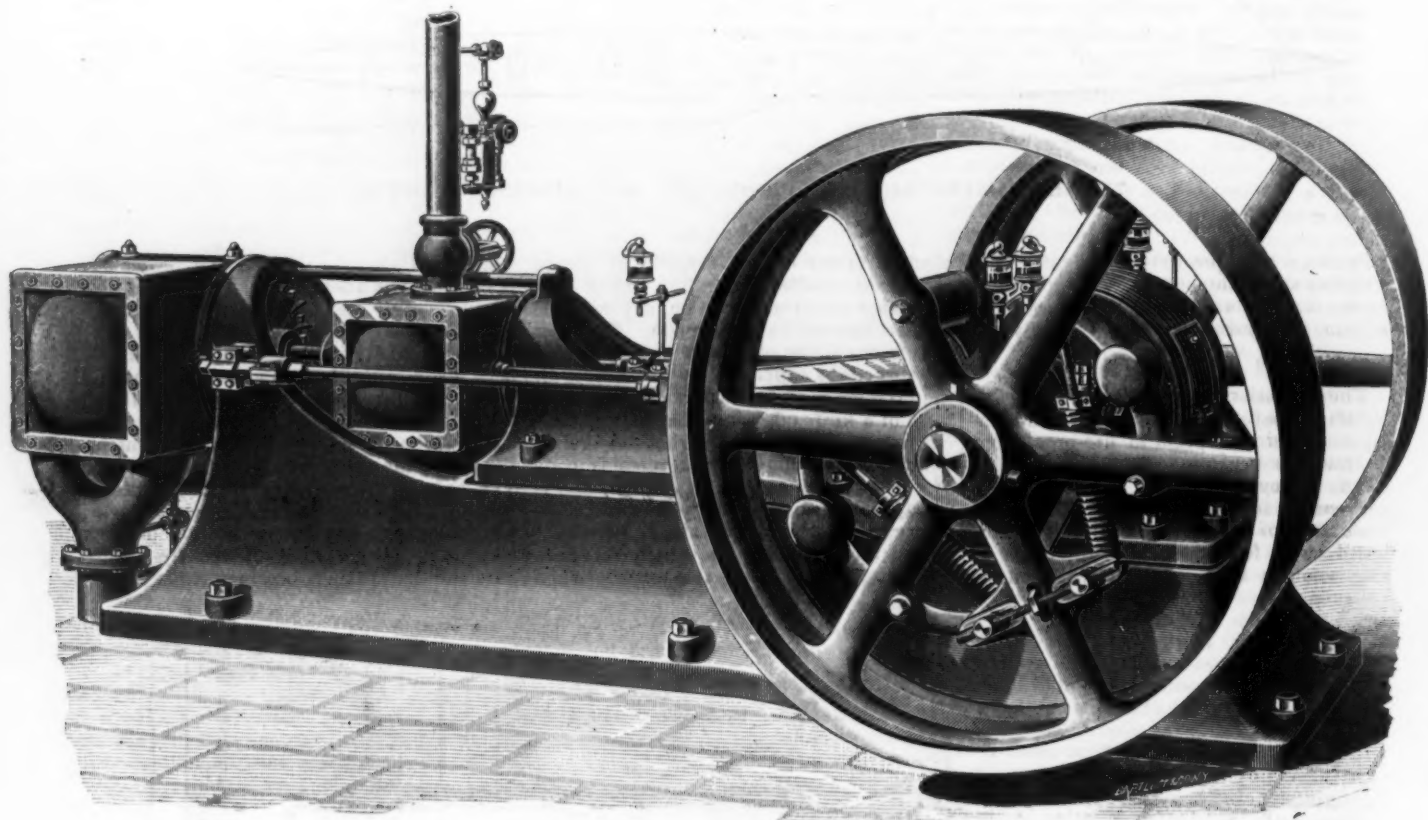
tachment to each valve, the engine is always in condition to take care of any load within range of its capacity and without disturbing any of the essential elements of compounding.

The Gauge of Corrugated Iron.

Last week a decision was rendered by Judge Shields of Omaha, Neb., in a case which was carefully watched by the corrugated iron trade of the country, and the outcome of which has judicially established what are the lawful gauges of corrugated iron in the absence of any definite contract.

The plaintiff in the case was the Wheeling Corrugating Company of this city, and the defendant C. Specht of Omaha. The order from the defendant read as follows: "Ship me two hundred squares (200) No. 20 corrugated black iron roofing, painted." The Corrugating Company shipped the

Previous to 1887 there were several different gauges in use by makers of corrugated iron in this country. In that year the National Iron Roofing Association met and agreed upon what is known as the Birmingham gauge as a standard to be used by all members of the association. The gauge thus adopted was widely published at the time and since, and is fully set forth in all the catalogues of members of the association. Some few manufacturers refused to conform to this standard, but the greater number now use it. The weights are approximate, of course, as it is utterly impossible to roll sheets with the same exactness as potatoes may be weighed, for instance. In this case the deviation from the approximate weight was but 2 per cent., and a change of $\frac{1}{8}$ inch in the adjustment of the corrugating rolls would more than make the difference. The court held that the adoption by the National Association and ensuing wide pub-



THE WESTON TANDEM COMPOUND ENGINE.

examination of the piston the loss from this item may be enormous.

Another feature of this form is the elimination of cylinder vibration, indicating great rigidity and securing permanent alignment. These engines have a balanced four-admission valve on each cylinder, and both valves are attached in a direct manner without rocker arms to the automatic governor, thus keeping the load about evenly divided between the two cylinders. This is stated to have decided advantages over the usual arrangement of having the low-pressure eccentric fixed to the shaft, or at best adjustable by hand; for owing to the variation of load constantly occurring in some lines of service, such as electric lighting, electric railways, rolling mills, &c., the hand adjustment is of little value, as the engine must be set for the entire run before starting to the maximum load that may be thrown on during the run; and as the actual load is considerably less during most of the time, the vital feature of compounding is destroyed. Whereas with the automatic at-

200 squares of No. 20, as ordered. It weighed 153 pounds to the square, which weight was shown on the invoice. The defendant accepted the goods and used them on the Union Pacific freight station at Omaha, Neb., for which use they had been purchased. When the bill was presented he claimed a deduction on the ground that the material was not really No. 20 corrugated iron, but an inferior or at least a lighter grade. The plaintiffs brought suit to enforce their claim, and the question as to what really constituted No. 20 corrugated iron came up for a legal adjudication.

Before the court Specht produced an 1889 catalogue of another company, which gave the approximate weight of No. 20 corrugated iron as being 187 pounds. The plaintiffs, on the other hand, by deposition and testimony of a number of the leading manufacturers, showed that the approximate weight of No. 20 corrugated iron, according to the Birmingham gauge, was 156 pounds, and that the Birmingham gauge was in use by a majority of the manufacturers of corrugated iron.

lication of the Birmingham gauge was sufficient to establish it as a standard understood alike by buyer and seller in a contract where no other gauge was expressly stipulated, and that the very slight difference between the approximate weight—expressly given as approximate weight in all trade catalogues—and the actual weight was but such as might reasonably be expected in rolling the sheets, and rendered a verdict in favor of the plaintiff.

A reduction in freight rates from Pittsburgh to various points East on ingots, blooms, billets, pig iron, rails and crop ends has been made and went into effect on Monday, the 2nd inst. The new rates per gross ton are as follows: To Boston, \$3.20; New York, \$2.80; Philadelphia, \$2.40; Baltimore, \$2.20; Albany, \$2.80; Utica and Oswego, \$2.40; Syracuse, \$2.25; Rochester, \$2. These rates apply from Pittsburgh and all points taking Pittsburgh rates, which include McKeesport, Beaver Falls and several other places.

WORLD'S FAIR NOTES.

Jackson Park is a veritable hive of industry these days. Its general appearance one day varies materially from that of the day following. A stump of a dismantled tree to-day is the corner-stone of an immense structure to-morrow. The laborers are many and the manner of working systematic. Day and night, in sunshine and shadow, the work of construction goes forward. Each 24 hours lessens the opportunity of the croaker to croak.

The Manufactures and Liberal Arts Building, which one week ago was represented only by a few stakes, a mountain of irregular timbers and piling, to-day presents an entirely different appearance. It is located near the lake. Men and machinery are employed day and night fitting timbers and other material employed in the construction. The foundation of the north end is completed and most of the floor laid. The south end is not so far advanced. Ten carloads of material per day is being used in the construction. When completed the building will cover nearly 40 acres of ground.

Directly west of Manufacturers' Building is the Electrical Building, which is 845 x 700 feet. The foundation of this immense structure and most of the flooring are complete. With all of its immensity, those who desire to make an electrical exhibit are so numerous and their requests for space so extensive that the building will not accommodate them. The "Wizard of Menlo Park," Edison, alone wants one-seventh of the available space.

The roof iron work on the Mines and Mining Building has been much advanced. Nine out of the ten great cantilever trusses for the central arched roof are now placed. More than 1,500,000 pounds of steel and iron will enter into the construction of this building. This week "staff" filling will begin on the sides. On Transportation the carpentry work on the first story is approaching completion, and it is well advanced upon the clear story east and west extensions. Work upon the elaborate design of the great golden door or arch on the eastern exposure facing the lagoon is well along. Staff filling is to begin here next week. For the Administration Building sufficient iron work has now arrived to permit its construction to be carried along uninterruptedly, and the week just closing has made a great change for the better. The handsome outlines of this structure are now showing up well.

South of this building is Machinery Hall, which will be the Mecca of thousands who have no technical knowledge of the ponderous engines or the interminable network of machinery to occupy the hall. The foundations of the structure are almost complete. A small army of men are at work on the building. An annex having a length equal to two city blocks is under construction at the west end of Machinery Hall, the foundation of which is about complete.

Across the lagoon to the east of Machinery Hall is the Agricultural Building and annex. The main building is two and one-half city blocks in length by two wide, and the annex over a block in length by almost a block in width. Sufficient timber has already been placed in the building to construct a country hamlet. A large force of pile drivers is at work on the east end of the building. The annex to this structure has a length exceeding one city block and a width almost equal to a block. It will be built over the adjacent lagoon. The timbers for the foundation are being placed in position. South of the annex and across the intervening lagoon will be the immense system of cattle sheds. These sheds will be one story high and so constructed as to afford com-

fort to the cattle and secure the greatest measure of sanitation. They will cover nearly 45 acres of ground. The preliminary work of construction has commenced.

Everything fairly considered, the progress of construction work during the past month has been marvelous. The system of prosecuting the work is commendable. It is a perfect piece of machinery. The amount of friction to be expected from conflicting interests has proved extremely small. But rapid as has been the progress thus far made, it does not satisfy those in charge of the work. Last week the Chief of Construction, realizing that no time was to be lost, ordered all of the contractors to double the number of their workmen and to put in 16 hours a day. There are to be two shifts of men, each working eight hours. W. J. Edbrooke, the architect of the Treasury Department, was the first to hurry up the work. He visited the grounds and informed Contractor Rees, who has the construction of the Government Building in charge, that he would have to double at once the number of his workmen. Little, if any, hardship, it is thought, will be entailed upon the contractors, since by the recent completion of the electric light service adequate provision has been made for working men night and day. The necessity for crowding things a little, it is thought, will be understood when it is known that on the seven buildings indicated, which are under way, less than 1000 men are now employed. Some of the contractors have complained that they were waiting upon the iron, but in the case of the Manufactures Building, which is two blocks wide and six blocks long, and where on the foundation work no iron is to be used, the belief is expressed among World's Fair officials that the force might be quadrupled rather than doubled.

Now that the electric plant has been completed, it is stated that the use of steam engines will be discontinued on the grounds. This is to be done in order to reduce the fire risk. The saw mills, which have been previously run by steam, are to be supplied by electric power, furnished, if desired, night and day. Electricity Engineer Sargeant is prepared with a 60 horsepower plant to begin supplying electric motor service. In a few days 300 horsepower will be available.

The Staff Work.

The staff workers on the grounds are doing some beautiful work. Some of the sketches in clay for the adornment of the various buildings even now present a striking appearance. Among others were noticed three allegorical female figures, 15 x 25 feet. These are to be placed over the entrance of one of the main buildings. The particular building has not been designated. One of the features which will make these decorations particularly attractive is the extreme high relief in which they are made. By using elastic material for molds the contractors are enabled to accomplish this desirable result. Technically it has not heretofore been accomplished. The foliated or floral decorations promise excellent results. Only an indefinite idea can be obtained at present, because the larger pieces, as they are developed, are put in wet cloths until completed in order to keep the clay in proper working condition.

There is to be a new kind of staff used in the ornamentation of the Fine Art Palace. Some time ago bids were asked and received for the staff work. In the meantime the Medusaline Mfg. Company of New York and Chicago had entered the contest with a different preparation and since then all previous bids have been declared off. This new staff is more expensive than the ordinary staff, but is susceptible of being molded into the forms

of material which usually require hand cutting and polishing.

The directors of the Acme Cement Plaster Company of Salina, Kan., a corporation that is furnishing much of the material used in the preparation of the staff for the World's Fair buildings, held a meeting at the Grand Pacific last week at which the company's headquarters were transferred to Chicago. The company have just been incorporated under the Illinois law, with \$500,000 paid-up capital. The officers are: President, W. W. Watson; vice-president, O. P. Hamilton; secretary and treasurer, M. J. Wells; directors, G. W. Clowson, Paul Franke, J. A. Finkler, A. M. Clafin.

More Building Contracts.

Contracts for three fire-proof buildings were authorized by the Committee on Buildings and Grounds on the 27th. The structures are to be used for storing exhibits and for freight and express company warehouses. The contracts were as follows: Carpentry work, H. L. Enrich & Co., \$12,940; roofing, sheet metal and skylights, W. V. White, \$5365; painting and glazing, Matthew Snerk, \$1364. The structures are to be each 65 x 200 feet and one story high. They will be located southeast of Machinery Hall.

The Committee on Grounds and Buildings has awarded the contract for the construction of water pipe to T. C. Brooks & Co., of Grand Rapids, Mich., for \$86,816.

Transportation Matters.

Transportation for visitors to the World's Fair between the city and Jackson Park has been under discussion during the last week. Several meetings have been held by the representatives of the city, the Illinois Central, the South Side cable road, which runs to the fair grounds, and the exposition management. The conferences have resulted in a stirring up of the transportation question and a sub-committee has been appointed to map out what it is considered each one of the various organizations represented should do in the interest of World's Fair transportation.

Transportation rates on articles intended for exhibits will be the regular tariff rates of the railroads, plus eight cents per 100 pounds for switching charges at Jackson Park. This will bring the rates from the various Atlantic seaports all the way from 28 to 83 cents per 100 pounds, according to the class of freight in which the goods fall and the port from which they are shipped. The goods will be returned to starting point free of expense, except for the switching charges at Jackson Park. Of the eight cents per 100 pounds switching charges, three go to the Illinois Central and five to the Exposition Company. Freight charges on exceptionally fine goods, such as statuary, paintings, china, &c., and on horses and other fancy animals, will be somewhat higher than indicated above.

Exhibitors can have their empty cases, in which their exhibits are transported to the exposition, stored during the fair for 2 cents per cubic foot; or stored and insured for 2½ cents per cubic foot. The latter rate is less than one-sixth what was charged exhibitors at the Paris Exposition of 1889.

Street Railway Exhibits.

At its meeting in Pittsburgh on the 21st ult. the American Street Railway Association appointed the following committee to co-operate with Chief Smith of the World's Fair Transportation Department: Henry M. Watson, Buffalo; George W. Pearson, Washington; G. Hilton Scribner, New York; John B. Parsons, Chicago; E. B. Edwards, Philadelphia; Frank H. Monks, Boston; Thomas Lowrie, Minneapolis; Charles Green, St. Louis; Edward Lusher, Montreal; W. H. Martin, San Francisco,

and W. J. Richardson, Brooklyn. This association desires to make a collective exhibit in the Transportation Department, and has asked for 50,000 square feet of space.

Applications for Space.

Applications for space in the Machinery Department are coming in rapidly. Some time ago Chief Robinson sent out about 1400 circulars to the machinery manufacturers of the country asking if they intended to exhibit goods at the exposition. So far more than 100 replies have been received, and only one announced the intention not to exhibit. Chief Robinson says he will allot no space in his building for several months yet.

Steam Economy in Rolling-Mill Engine Practice.*

BY D. ASHWORTH, PITTSBURGH, PA.

The fundamental principle of economy in steam-engine practice is simply to use the steam as hot and dry as possible, and after it has done its work to get it out of the way as quickly as possible. This is the simple way of expressing it. The multitude of efforts and legion of applications each and all converge to this central idea. In the New England States, especially, largely engaged in the manufacture of textile fabrics, and the marine service, were the places where close attention was given to this matter, and for a long period of time almost exclusively so. In the cotton districts it was principally brought about by the transition from the primitive water power to steam, which, as can readily be perceived, demanded close and economic results, and, as important, if not paramount to all else, close, uniform regulation.

The advent of the Corliss and Sickles drop rapid-valve movements was the great bound toward the ideal of cutting off sharply and quickly, resulting in obtaining the full benefit of expansion. These were followed by a number of other types of automatic engines, which, by movements peculiar to themselves in certain lines, have equalled if not surpassed their predecessors. So refined and perfected did these engines become that they almost became universal, not only in America, but in all other nations, a fact which should challenge our patriotism and pride. Yet, notwithstanding the gratifying and favorable results of this advance in the right direction, as described, there still remained, in many sections of our country, a seemingly tenacious clinging to the old wasteful type of engines in all our stationary practice, especially in our iron and steel works.

We might safely say that this conservative position was, and is still, most prominent in the Ohio and Mississippi valleys and tributaries thereto. Our sister States of the North and Northwest are rapidly taking up, with the States of the East, the adoption of the refined automatic engine practice. To these people, visiting our locality, these conditions of conservatism partake somewhat of a wonder, but to ourselves, in looking backward, we note with satisfaction, progress. Who amongst us does not occasionally see the old long pop gun cylinder in the scrap yard, a silent but impressive reminder of the past, and as we move about our works, the great number of engines of a more modern type, showing that while we are not at the front in modern practice, we are rapidly moving on. The pertinent question which presents itself is, why not at the front? Why have not these engines of economic automatic type been adopted by us? Why has not steam economy in engine practice received our atten-

tion until within a late period? The answer would be that our natural resources for fuel seemed boundless, and in close proximity to the works, in fact, they frequently being at the mouth of the coal mine; therefore, economy in this direction was of but little importance as compared to other features in manufacturing.

Another factor entered greatly into the question—viz., river practice. I believe that it is generally accepted as a fact that the most conservative engine practice has been, and is still, to be found upon our Western rivers. The peculiar requirements of this service were such as to bring about these conditions. In the palmy days of steamboats, steamboat engine practice served as a model for all our cities and towns, and upon all disputed points great deference was paid to the steamboat engineer.

While this branch of service is rapidly becoming a lost art, economy of steam was but little entertained in this service, the result being exceedingly wasteful. This practice rapidly found its way into stationary mill practice. This last feature deserves our earnest consideration, for upon it hinges many other points. Sometime during 1852 or thereabouts, the Corliss engine was adopted in one of our cotton mills with success, but in our steel and iron works, the adoption which closely followed that of the cotton factory, proved to be a source of disappointment, resulting, unfortunately, in retarding the advancement which, at that period, seemed about to take place.

Yet, notwithstanding this rebuff, engine builders have, in our country, continued to advance in the direction of better workmanship, but were exceedingly tardy in the important point of steam economy. It is beyond question, I think, and conceded by all unprejudiced observers, that in our practice we are consuming from 20 to 40 per cent. more steam for a given amount of work, than we should, and this amount as compared to the modern type of engine, not including the compound system. We may well say: "Can such things be and overcome us as a summer's cloud without our special wonder?"

The question which suggests itself now, at this stage, is, with the examples in other fields and the lapse of time, why do we in the eyes of others not familiar with our special work, seem so exceedingly tardy in this direction, and also frequently manifest a tenacious reluctance at accepting the new? Before attempting to reply to this, let us contrast the results of steam distribution as shown by diagrams taken from the automatic and plain throttling engine.

No. 1-2. Diagram from Corliss engine, 16 inches by 42 inches at 75 revolutions, with a fair load.

The initial is close to the boiler pressure, the terminal pressure is low, the cut-off is sharp and distinct and the expansion closely follows the Mariotte curve.

No. 3. Here we have diagram from a Wright engine, 38 inches by 60 inches at 64 revolutions, while driving the cable railway at Cleveland, Ohio. And now, one of a number taken by me from the No. 4 famous Pawtucket engine last June. The economy of the last has been a marvel in engineering. Now, as a contrast, I present diagrams of some practice in our own locality. As they are presented, we may well say with the poet: "Look upon this picture and then upon this." This is from a poppet valve of the No. 5 steamboat side lever type. Observe how far we are from boiler pressure and the tardiness of the release and exhaust closure.

This diagram, No. 6, is from one of our best Pittsburgh engines for mill practice, massive in proportion, liberal port openings; in general design and workmanship well adapted to stand up to the work continuously, although still lacking the feat-

ure of steam economy. Now, that the two types have been presented, let us place them in close contact. Here we have the ideal automatic drawn over the actual diagram from our best throttling engine. Notice how we lack the high initial pressure, there being 20 per cent. less pressure than in the receiver close to engine. We also have an exhibit of the wire drawing throttling process, resulting in a high terminal.

Keeping in mind that the graphical representation of engine economy is high initial and low terminal, here you will observe we have the reverse in the throttling engine, the initial being far too low and the terminal too high. You will clearly observe the volume of steam passing beyond the expansion line, virtually doing no work, but which must be disposed of in the exhaust, and is generally liable to give back pressure.

I have on file diagrams taken by me, showing as high as 50 per cent. of the work to be against its own back pressure. As a curiosity here is an exhibit of one of such character. It is a very simple process to give this a humorous turn; by inverting it we obtain a fair throttling diagram. Such cases I frequently meet, and occasionally a high grade automatic is met which makes a shocking exhibit. Here is a case I was called upon some years ago to make indicator test for the purpose of ascertaining what power, if any, was in reserve, and if sufficient to drive a contemplated addition to the department. The diagram No. 7 was the result. Now, this is from an engine which has a national reputation, but by reason of derangement of valve gear it was working so wastefully; but after readjustment, which took but a short time, it gave us this card. It is almost useless to say that there was ample power in reserve. This case goes far to show that there is as great a possibility of having bad results in the automatic as in the throttling practice, unless given close attention.

Referring to the combination of automatic diagram and throttling diagram, our computations show in favor of the automatic, 185 horse-power against 169 horse-power for the throttling. About 5 per cent. more work and 33.6 per cent. less steam. But it is said by some that this does not by any means represent the fair condition, or in other words, the repairs, skilled attendance, and loss of time by stoppages by the automatic, which generally far over balances the steam economy of the best of our throttling engines. Now I am aware that this view is received by the educated engineer and expert in a very light manner generally, which is entirely wrong. It is a very important matter and worthy of our careful consideration, and cannot be flippantly ignored.

We all should realize how great the loss is in an establishment by reason of stoppage of motive power for a short time even; what must it be when the stop is of a lengthy period? I was forcibly reminded of this but a few weeks ago. In conversation with one of our prominent steel manufacturers, this very feature presented itself. Pointing to an engine laid aside in the yard, having been displaced by a more powerful one, he said: "That engine was in operation almost continuously for ten years, and in all that time there was no interruption to work from it, and outside of general work, the expenditures upon it did not run to \$10." Upon another occasion, being asked how a certain grade automatic engine was doing that was placed about eight years ago, the answer was: "Oh, that went into the scrap pile long ago." Yet the latter, beyond any question, had the requisites for steam economy.

I say it with feelings of regret, that up to within a brief period the prime cause of the tardiness of the introduction of the automatic type of engines for mill practice

* Read before the Society of Engineers of Western Pennsylvania.

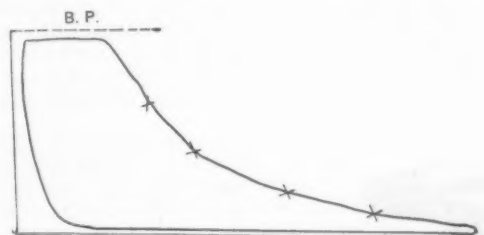
has been the placing of engines entirely unadapted for the iron and steel practice. The magnificent automatic engine drives the mammoth flour mills or the factory of spindles and looms with splendid economic and mechanical results, but thus far they have not given continuous service with ordinary attention in the reduction of heavy iron and steel requirements and heavy loads abruptly thrown on and off in a rapid intermittent manner, the shocks and strains being of the most violent character.

We therefore conclude that the steam engine for our mill practice has yet to be

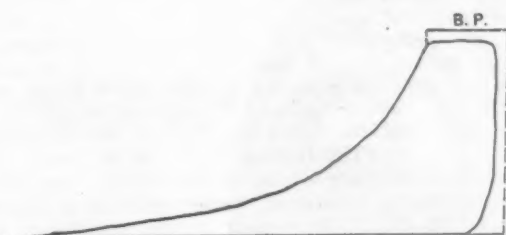
which we must credit the examples of river practice. It is of the greatest importance. Without it we cannot expect to receive the benefits of expansion, with the great advantage of high initial pressure. Knowing that to raise 1 pound of water from 32° F. to 212° F. and convert it into steam at atmospheric pressure requires 1146 heat units, whereas it only takes 1191 heat units to raise it from 32° F. to 358° F., and to produce steam of 150 pounds per square inch, or merely the addition of 45 heat units or only about 4 per cent. more coal will be required to produce

will be the general rule in our mill practice.

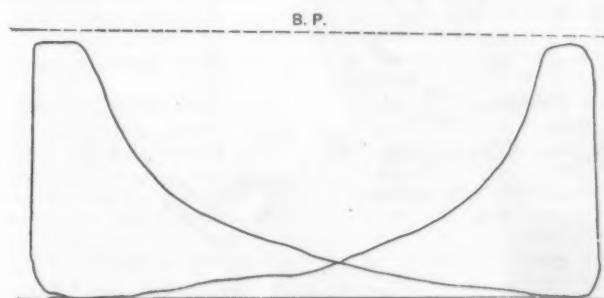
With our vastly improved tools and excellent materials, boiler manufacturers are now well prepared to meet the earnest and growing demand for the higher pressures. With this valuable adjunct now assured, can we not look for the early application of the multiple cylinder compound engine, thus reducing to a minimum the enormous amount of exhaust steam thrown into the atmosphere with the reduction of the condensation inseparable with the action of the single cylinder?



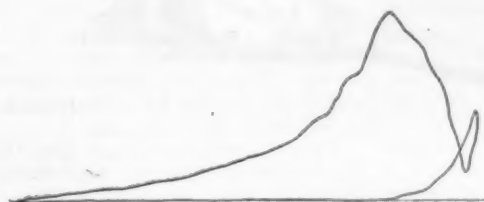
No. 1.—Corliss Engine, 16 x 42, 75 Rev.



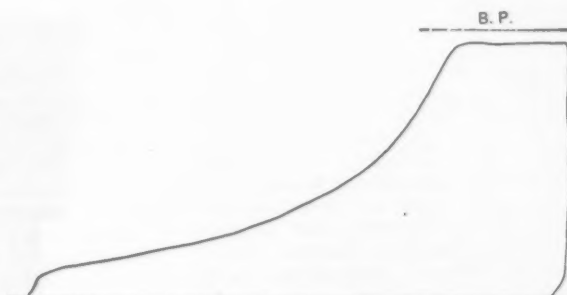
No. 2.—Corliss, 16 x 42, 75 Rev.



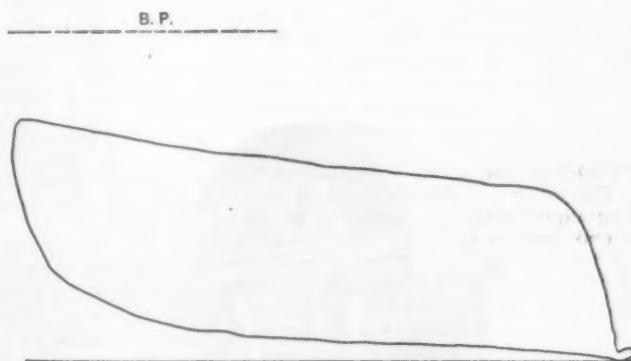
No. 3.—Wright Engine, Cable R.R., Cleveland, 38 x 60, 64 Rev.



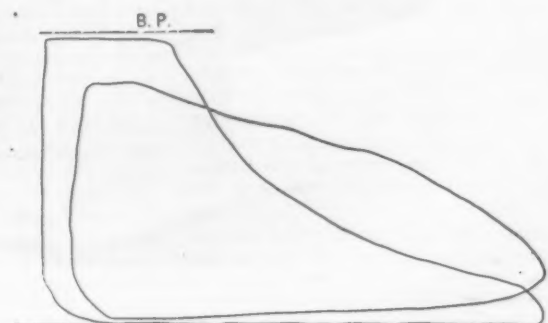
No. 7.



No. 4.—Pawtucket Engine.



No. 5.—Poppet Valve.



No. 6.—Automatic versus Throttling.

STEAM ECONOMY IN ROLLING-MILL ENGINE PRACTICE.

built to cover the requirements of durability and steam economy. From what has already been said, the requirements are: 1, Massive proportions to receive all shocks and intermittent strains; 2, Liberal ports for steam and exhaust, free and uninterrupted flow of steam from main pipe, an entire absence of throttling or wire drawing; 3, Clearance reduced to a minimum; 4, Quick-acting valve movements with least number of parts, cutting off under varying loads from $\frac{1}{4}$ to $\frac{3}{4}$ stroke.

In connection with this we earnestly advise the carrying of higher pressures of steam. This, generally in Western localities, has been well advanced upon, for

steam of 150 pounds pressure than would be required to generate steam of atmospheric pressure.

The rapid increase of steam pressure in the marine service has enabled the compound system to be almost universally adopted, and instead of 8 to 9 pounds of coal per indicated horse-power per hour as formerly, we have now vastly better results with 190 pounds of steam with an expenditure of but 1 $\frac{1}{4}$ pounds of coal. Now, if this can be accomplished under such limitations of space and position, can we not at least do as well on *terra firma*? I firmly believe that the time is not far distant when all these features

Another point to which your attention is called—so simple that it at first sight would seem superfluous—namely, proper proportions of piping of steam and exhaust connections, simple, vital and important as they are, the principles seem to be more honored in the breach than in the observance. Many engines, otherwise in condition for excellent results, have met with condemnation by reason of insufficiency of steam pipe, or, as I have often seen, a number of unnecessary elbows and turns, which have often suggested the query, if there had not been considerable ingenuity exercised by the erector as to how circuitous it could be made to reach a given

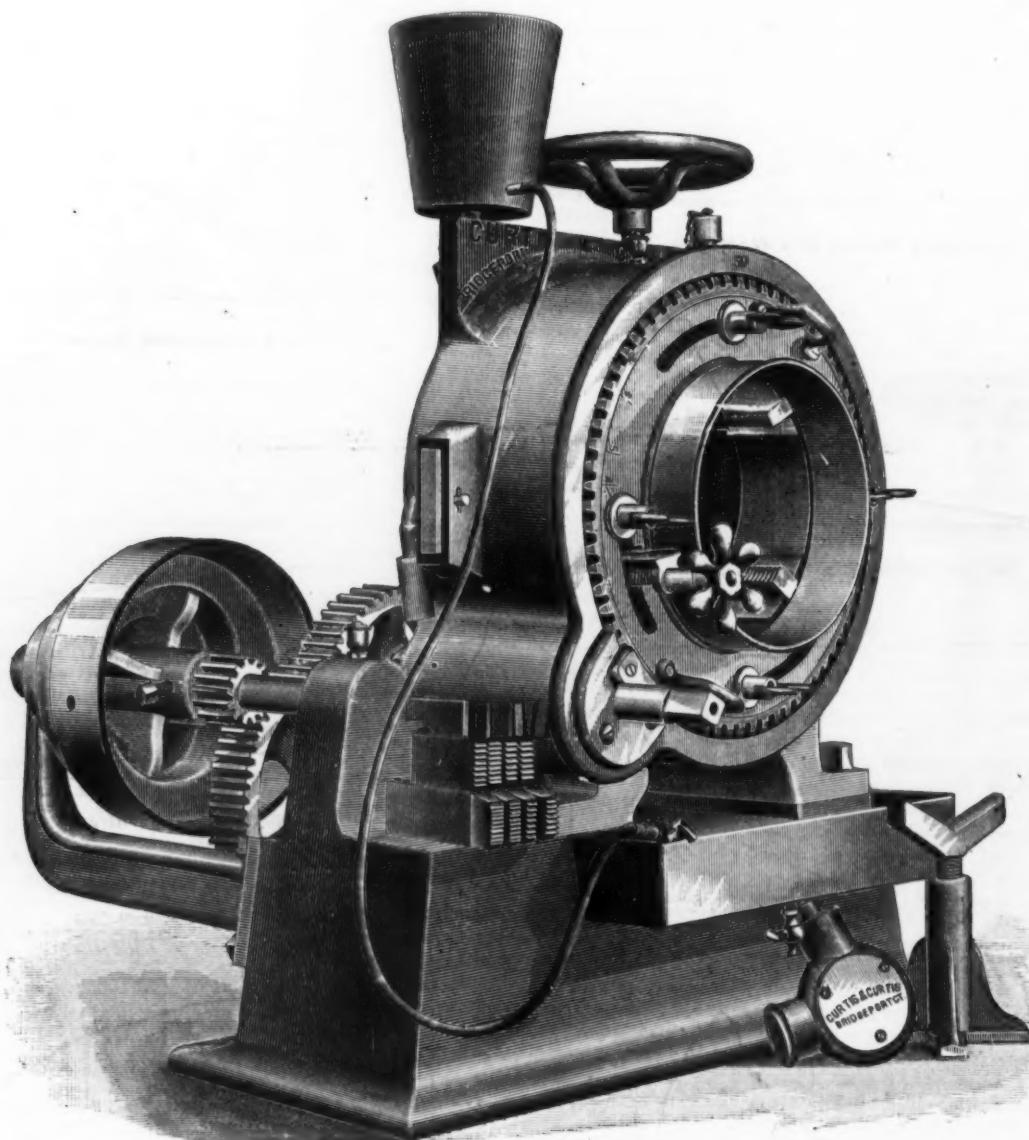
point, in preference to a straight line. Closely allied to this is the absurd propensity that some manufacturers have of placing the governor on top of column or flanged pipe. Said pipe is usually polished to form, as it were, a central point of attraction. This it may be to the proprietor knowing nothing of the principles involved, but to the engineer, that is appreciative of a close regulation, knowing the importance of as close connection as possible, as he looks upon that resplendent pipe, and as he gazes, thinks of the designer, "And still the wonder grew, that one small head could carry all he knew."

that proprietors wonder that there is so little intelligence in the line of stationary engineers.

To create a change in the right direction, to elevate to a higher plane, is a duty incumbent upon all manufacturers, this society, and to all of us individually. To encourage them in their readings and lecture in their societies, assist, if need be, in their maintenance by adding to their libraries and apparatus, and above all things, if possible, to enthuse them with the fact that the field is worthy of their effort, and that we are directly, personally interested in their mental, mechanical and moral advancement. With the advancement in

Pipe Cutting and Threading Machine.

It is believed by the makers of this machine—Curtis & Curtis of Bridgeport, Conn.—that it has a larger range than any other combined hand and power machine on the market. It cuts off and threads from 2½ to 8 inch pipe, right hand. Instead of a worm and wheel, as in the smaller machines of this class, a train of gears is employed, which gives great power and durability. It is furnished with an oil tank, shown on the top. The machine proper is attached to a base, from which it can be easily removed and carried about as a hand



PIPE CUTTING AND THREADING MACHINE.

This paper would be lamentably incomplete were we to omit the last, but far from least important adjunct, the engineer in charge of the engine. It is a deplorable fact that there is in this large army of operatives a large proportion who are utterly lacking in knowledge, skill and ambition, or any of the requirements to qualify them for such important trusts. I know it to be true that there are a goodly number the reverse of this, but the first-mentioned are vastly in the majority and increasing, I think. What is the cause and how to remedy this condition is pertinent. One of the principal and, I might say, the most prominent, is that pernicious sentence heralded forth by almost every creator of a new engine, boiler or steam appliance: "No skilled engineer required." And to such a low stage has this become,

our steam practice, which we hope is to come, and at an early period, by reason of simplicity of valve gear with durability, with higher intelligence at the throttle, the economy in fuel, through this source, throughout our manufacturing district, will be almost incalculable. After that we will be prepared to conquer other fields by compound, triple and expansion engines in our rolling mill practice.

Canadians meet with unexpected difficulties in attempting to contract with capitalists in England for the establishment of a direct line of mail steamships. The offer of a subsidy as high as \$750,000 per annum was without avail. The amount of freight offering is too precarious, and navigation in the season of heavy fogs is hazardous.

machine on outside work. The die stock is the well-known Forbes design.

The dies are set by turning the face plate to the proper graduation, and any variation in the fittings may be allowed for, and the pipe cut either over and under standard size, by making the proper allowance at the graduation. When the dies are set to the proper size the pipe is inserted through the self-centering vise at the back, with the end to be threaded against the back of the dies, and is clamped and brought central with the dies by turning the hand wheel shown on top of the machine. When used as a hand machine the crank is then put on to the square end of the pinion, shown in front of the machine, and through it the power is transmitted to the die-carrying gear. When the thread is cut to the required length the machine

is run backward for about one turn, so as to take off any burr that the dies may leave; the dies are then drawn back and the pipe is removed. The depth of the shell allows the thread to be cut about twice the standard length, and by moving forward the pipe a thread of any length can be cut. The machine complete weighs 900 pounds.

Valve Reseating Machine.

The Morse Valve Reseating Machine, of which engravings are here presented, can be attached to all makes of valves from $\frac{1}{4}$ to 4 inches, inclusive, regardless of the size of the thread or the diameter of the opening of the valve. The device for attachment consists of an expanding chuck, shown in Fig. 1, with threaded jaws that can be quickly and securely adjusted. The seat of valve is trued by means of steel

planished, or glanced thinner than No. 25 wire gauge, and valued at over and under 3 cents per pound respectively.

Duty was assessed upon the portion of the merchandise valued at less than 3 cents per pound at $1\frac{4}{10}$ cents per pound, under paragraph 142, act of October 1, 1890, and upon the part valued at over 3 cents per pound at $1\frac{6}{10}$ cents per pound, under paragraph 146, N. T.

In addition to the above rates of duty $\frac{1}{4}$ of 1 cent per pound was assessed upon the entire importation, in conformity with the proviso attached to paragraph 144, N. T.

The appellants claim "that even if the merchandise is cold rolled, it is not liable to duty as provided for in paragraph 144 of said act, unless it is also pickled and cleaned by acids," &c. They further claim that "the assessment of duty at the rate of $1\frac{6}{10}$ cents per pound upon the sheets valued at above 3 cents per pound

nation of samples thereof, has been pickled or cleaned by acid or by some other material or process also, but this point is not considered material by us, as the fact of its being cold rolled is deemed sufficient to bring it within the scope of the proviso attached to paragraph 144, N. T., which provided in the alternative that "sheet taggers, iron or steel, . . . cold rolled, shall pay $\frac{1}{4}$ of 1 cent per pound more duty than the corresponding gauges of common or black sheet or taggers iron or steel." This proviso, with the addition of the word steel, is a reproduction of T. I. 152, act of March 3, 1883, under which act black taggers, cold rolled, without regard to value, was made to pay $\frac{1}{4}$ of 1 cent per pound more than black taggers, plain, of the same thickness.

This paragraph of the act of 1883 has an important bearing upon the scope of the proviso attached to paragraph 144 of the present act, and may be accepted as a legislative interpretation of a doubtful point.

We, therefore, reach the conclusion and hold that sheets of steel, without regard to value, commercially known as common or black taggers, thinner than No. 25 wire gauge, not polished, planished or glanced, but cold rolled, is dutiable at $1\frac{4}{10}$ cents per pound, and in addition thereto $\frac{1}{4}$ of 1 cent per pound.

The claim of the importer that all of the merchandise is dutiable at $1\frac{4}{10}$ cents per pound, under paragraph 142, N. T., is sustained. Their protest, however, against the assessment of $\frac{1}{4}$ of 1 cent per pound duty in addition to the above rate is rejected, and the action of the Collector in this respect is reaffirmed.

STEEL TUBES, BICYCLE FORKS.

Before the United States General Appraisers at New York, October 2, 1891. In the matter of the protests, 7232 b, and 7931 b, of Parkhurst & Wilkinson, against the decision of the Collector of Customs at Chicago, Ill., as to the rate and amount of duties chargeable on certain forks for bicycles, imported per Chicago, April 24, 1891; and Arizona, June 4, 1891. Opinion by Sharretts, General Appraiser.

We find as facts in the present case that the merchandise was imported subsequent to October 6, 1890, and is of two kinds:

1. Oval-shaped straight steel tubes, 17 inches in length, gradually tapering from $1\frac{1}{4}$ inches to 1 inch wide, and invoiced as straight forks.
2. Oval shaped steel tubes, 18 inches in length, curved at one end, the extremity thereof flattened; invoiced as curved forks, patent ends.

We further find that the tubes are in the rough, designed for and are intended to be used in the manufacture of bicycles and are known in trade as parts thereof.

Duty was assessed upon the goods at 45 per cent. ad valorem, under paragraph 215, act of October 1, 1890, as manufacturers of metal not specially enumerated or provided for.

The appellants claim that the goods are steel tubes and are dutiable at $2\frac{1}{2}$ cents a pound, under paragraph 157.

The appraiser, in a special report to the Collector, relative to the proper classification of the goods, expressed the opinion that the claim of the importers was well founded with regard to the straight tubes, but was not tenable as to those curved and flattened at the end.

In G. A. 483, the board held that tubes for bicycle wheels were dutiable at $2\frac{1}{2}$ cents per pound, under paragraph 157. Applying the principle enunciated therein in the present case, we hold that the mere curving of a portion of the tubes and flattening the ends thereof does not remove them from classification as tubes, they not having been manufactured into articles subject to specific enumeration.

The protest is sustained as to all of the merchandise.

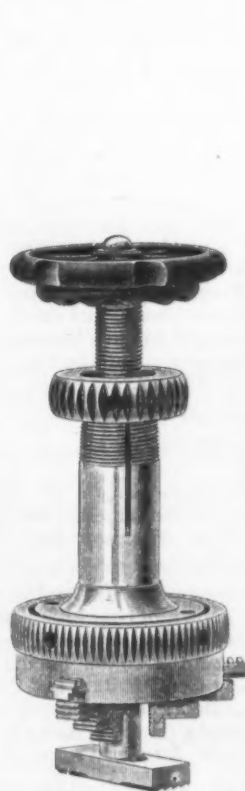


Fig. 1.—View of Machine.

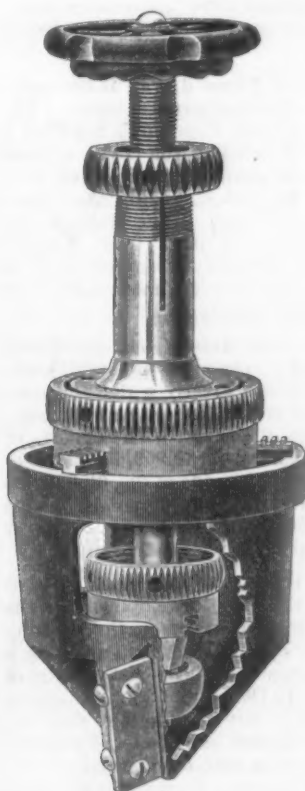


Fig. 2.—Machine in Position Truing a Valve Disc.

THE MORSE VALVE RESEATING MACHINE.

cutters carried on the lower end of a shaft provided at its upper end with a hand wheel. The second illustration shows the disk holder and cutter in position truing a valve disk. This machine is made by the Leavitt Machine Company of Orange, Mass.

Treasury Decisions.

BLACK TAGGERS SHEET STEEL, COLD ROLLED.

Before the United States General Appraisers at New York, October 1, 1891. In the matter of the protests, 8912 b and 8913 b, of Messrs. Bruce & Cook, against the decision of the Collector of Customs at Philadelphia, Pa., as to the rate and amount of duties chargeable on certain black taggers sheet steel, imported per British Princess, January 22, 1891, and British Prince, January 5, 1891. Opinion by Sharretts, General Appraiser.

We find as facts in the present case that in January, 1891, there was imported into and entered for consumption at the port of Philadelphia certain sheet steel, commercially known as "black taggers," cold rolled, smoothed only, not polished,

was erroneous, for the reason that said goods are black taggers and nothing else. . . . They are, therefore, dutiable as black taggers, in accordance with section 5 of said act (October 1, 1890).

No higher duties should be assessed upon the same than 45 per cent. ad valorem, in accordance with the provisions of said act covering manufactures of iron or steel not specially enumerated or provided for in the act."

The board, in G. A. 430, held that inasmuch as paragraph 142, act of October 1, 1890, provides only for black taggers, iron or steel, valued at 3 cents per pound or less, that black taggers iron valued above 3 cents per pound was excluded from classification thereunder, and was dutiable at 45 per cent. ad valorem, under paragraph 215, N. T. We adhere to the above ruling.

In the present case, however, the black taggers is composed of steel and is cold rolled, two conditions absent in the material covered by the decision referred to.

We are of the opinion that the black taggers in question, based upon an exami-

THE WEEK.

According to the trade returns of the treaty ports in China for the year 1890, the number of American firms in the empire was 32 and the number of residents 1153, including foreign representatives, consuls, ministers and *attachés*. The classification according to occupation, as supplied by the American Minister at Peking in 1887, gives the number of missionaries at 506.

The French Government has organized a Bureau of Labor similar in its general features to the plan of the Department of Labor at Washington, of which Carroll D. Wright is commissioner.

Engagements of grain by the steamship lines from New York to Europe are now limited only to the carrying capacity of the ships, as shown by the advance in ocean freights. But all American harbors are likely to swarm with tramps, offering to compete with the regular lines. A number of steamers are engaged to load with rye. The rush of business will not culminate until the corn crop is ready for export.

A company, with ex-Judge Dittenhoefer as president and ex-Postmaster General James as vice-president, has been organized to establish a line of steamships between New York and Brazil, and as soon as the bonds can be placed and steamships bought or built a line of steamers supplemented by a number of sailing vessels will begin making regular trips between New York and other Atlantic ports and the Brazils, so it is said. The trouble is that the freights offering are insufficient to maintain lines already established.

Philadelphia is to have another great independent sugar refinery, in competition with the Sugar Trust, now known as the American Sugar Refining Company. The property secured is about one square south of the Spreckels refinery, and has a frontage on the Delaware River of 274 feet. The McCahan Company, as the new concern will be named, will be a stock corporation, capitalized at \$3,000,000, of which more than one-third has been subscribed by W. J. McCahan & Co.

The Central Railroad of New Jersey has concluded negotiations for right of way for the new line to Long Branch, via the north shore of the Navesink Hills. The route will be by boat to Atlantic Highlands, where a railroad pier will be built out into the Raritan Bay 1600 feet, giving depth of water for landing at all tides. Thence eastward along the shore to the mouth of the Shrewsbury River by rail. The river will be crossed by a drawbridge.

The McDonald oil field, in the Pittsburgh district, again broke the record by producing 73,000 barrels of petroleum in one day.

Railroad men are said to be awaiting with deep interest the result of the practical test of Edison's new motor, which, it is said, will soon be made on a line between Milwaukee and Chicago.

The recent invention at Arbon, Switzerland, of a new steam machine for making embroideries threatens to revolutionize the most important manufacturing interests of the Swiss republic.

The International Navigation Company who control several steamship lines at Philadelphia and at the port of New York, have decided not to compete for the American mails under the Postal Subsidy act; consequently no bids from them were among those recently opened by Postmaster General Wanamaker. The secretary of the company explained that they would not pay, because the first-class steamers could not be run profitably in winter, and

it is probable foreign Governments in sending their mails would discriminate in favor of vessels under their own flag.

The Empire State express of the New York Central and Hudson River Railroad, on its first trip, October 26, demonstrated its right to be called the fastest train in the world, by traversing the 440 miles between New York and Buffalo in 8 hours 41½ minutes, and achieved, besides, at one stage of the journey, a speed never before attained by so heavy a train.

At Foo-Choo, the principal Chinese naval station, unusual activity prevails. Vessels on the stocks are being completed as rapidly as possible and torpedo stations are being established.

The Baltimore and Ohio Railroad Company propose to expend \$5,000,000 for "betterments," which includes a good quantity of steel rails.

The regular lines of Transatlantic steamers from Montreal have their entire cargo space engaged for grain during the rest of the season.

The town of Ellwood, Pa., is becoming an active manufacturing center. The Shafting and Tube Company's building is a structure of wrought iron covering more than an acre of ground and is filled with machinery for making cold-drawn steel shafting and tubing. The former has been heretofore supplied from Europe. The Derwent Foundry Company will at once start a plant for the manufacture of stoves and light castings.

The report that Russia had prohibited the export of all cereals is apparently confirmed. This will greatly widen the market for all our cereals, as well as for wheat, in every part of Europe. The exports of Russia last year were 181,909,600 poods of wheat, 76,907,000 poods of rye, 60,669,000 poods of barley, 57,881,000 poods of oats and 20,611,000 poods of Indian corn. A pood is equal to 36 pounds avoirdupois.

Consular reports to our State Department show that the development of the cotton growing industry from the planting of American cotton seed in Turkestan a few years since has been little short of marvelous. In 1884 about 360,000 pounds were exported, but the present year the product will be not less than 125,000,000 pounds. At this rate of increase Americans may soon have a formidable competitor in Asia.

The Mexican International Steamship Company have been organized in Philadelphia, to trade between Philadelphia and Mexico, via Havana, by the election of these officers: President, William B. Bement; secretary and treasurer, George E. Bartol; general manager, James W. Porch. The capital stock of the company was fixed at \$500,000. It is expected that the first ship will sail about January 1. The ships will be chartered vessels, of about 2500 tons capacity, and the ports at which they will touch are Progreso, Campeche, Frontera, Vera Cruz, Tuxpan and Tampico, on the Gulf coast of Mexico, calling at Havana, Cuba, each way.

The Chambers of Commerce in St. Paul and Minneapolis are trying to provide threshing machines to North Dakota to secure the crop.

It is calculated that the ocean steam fleet sailing from New York, represents a total investment of \$500,000,000. There are at least six in the fleet that cost from \$1,500,000 to \$2,000,000 each. This is the sequel to DeLardner's unfortunate prediction.

Newfoundlanders complain of a breach of faith on the part of the United States, on the ground that whereas the provincial Government granted to Americans the privilege of obtaining free bait, in expec-

tation of concessions in return, the United States Government has stretched the tariff laws to the exclusion of fish caught by Canadian vessels. A heavy export duty on Newfoundland fish is spoken of in retaliation.

The Interstate Commerce Commission has taken a new departure. For the first time since its organization four years ago the commission has ordered restitution of excessive freight charges, in a case relating to the transportation of oranges between Florida and New York.

San Francisco News.

(By Telegraph.)

END OF THE 'MOLDERS' STRIKE.

At last the long-continued molders' strike has ended. The union met on Monday night, and almost unanimously adopted a resolution declaring the strike off. The foundrymen will not discriminate against the strikers on account of the struggle, and will not reduce wages. They will offer no objection to those already in their employ remaining members of the union should they so desire, but they will not recognize the supremacy of the union in the shops. The strike started at the foundry of Steiger & Kerr March 1, 1889, and has thus lasted 20 months. The molders lost at least \$250,000, and the manufacturers a very large sum. San Francisco has lost a portion of its trade in machinery, and on all hands it is acknowledged to have been most disastrous to the interests of the city, and its close is welcomed on every hand.

PERSONAL.

Andrew Carnegie, a son of the late Thomas Carnegie, has entered the laboratory of the Edgar Thomson Steel Works at Bessemer, Pa.

James Berryman of Philadelphia, whose name is well known in connection with his feed water heater, has returned from his third trip across the ocean, having spent four months in Great Britain and the Continent. Mr. Berryman collected nearly 700 photographs and is having them arranged in book form as a souvenir.

J. W. Wright has resigned his offices as superintendent and director of the Calumet and Meda Mining Company at Calumet, Mich.

J. H. Springer, formerly manager of the Niles Tool Works at Hamilton, Ohio, has accepted a similar position with the Ranken & Fritsch Foundry and Machine Company of St. Louis, Mo., made vacant by the death of Mr. Fritsch.

J. L. Morris of the Britton Iron and Steel Company has accepted the superintendency of the American Tin Plate Company at Ellwood, Ind.

H. M. Curry of Carnegie Bros. & Co., is reported to have sailed for Panama to examine an ore property.

The United States District Attorney for the northern district of Illinois has finished condemnation suits to secure a portion of the right of way for the Hennepin Canal. A strip 5 miles long, beginning at the mouth of the Rock River, has been secured, and the Government engineers are ready to begin work on the canal. Excavations will be made as soon as the Secretary of War approves of the condemnation proceedings. The canal will be 200 feet in width and will open a waterway from the upper course of the Illinois River to the Mississippi, making a short cut by water to the Northwest across the northern part of Illinois.

The Iron Age

New York, Thursday, November 5, 1891.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.
CHAS. KIRCHHOFF, - - - EDITOR.
GEO. W. COPE, - - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS - - - HARDWARE EDITOR.
JOHN S. KING, - - - BUSINESS MANAGER.

The Improvement in Western Bar Iron.

It is a commendable trait in a good watch dog to regard with suspicion every individual who has occasion to pass the house to which the said dog maybe attached, even though temporarily. The passing traveler may not even look at the house, much less show any intention of entering the yard, but it is the self-imposed business of the well-trained watch dog to regard the mere proximity of any one outside the family as an intrusion. The good watch dog manifests his displeasure by barking, and usually the more insignificant he is the louder is his bark and the more he appears to feel that he bears upon his weak anatomy the entire burden of defending the family and their property from impending danger. It is not a part of his training to discriminate, and perhaps that would be an impossibility, hence he will bark as ferociously at a physician on his rounds of mercy or a policeman on duty against lawbreakers as at a tramp.

This is precisely the attitude of a Pittsburgh trade paper which is known, perhaps, to a few of our readers. It has constituted itself a sort of guardian angel for Pittsburgh, and in carrying out its assumed mission it is continually engaged in warding off fancied attacks on Pittsburgh interests. One may assume from its usual condition of dullness that it is asleep at its post, but if the word "Western" happens to drop within earshot it is wide awake, with all its faculties strained to their utmost to catch anything which can be construed into an attack on Pittsburgh. One would then suppose, from its exhibition of solicitude for Pittsburgh products, that there was danger of that whole city and its vast manufactures falling into decay if it were not for such a valiant defender.

In our issue of October 1 an editorial was published under the caption of "Steel vs. Iron," in which statements were made relative to the improvement in the quality of Western common bar iron. These statements were based on facts and were not in any sense conjectural. The deductions drawn were rather complimentary to iron manufacturers, showing that they have not been retrograding, but have been making decided progress in the right direction. The Pittsburgh watch dog sees in this a covert attack upon the quality of Pittsburgh bar iron and straightway proceeds to bark furiously. It endeavors to make an issue between Eastern bar-iron makers and Pittsburgh manufacturers. We are not special advocates of any section, but treat all parts of the country with judicial

impartiality, and, therefore, decline to enter into any such discussion on sectional lines. It is not disputed that many Western bar-iron manufacturers have always maintained a high reputation for the quality of their common bar iron. But the strongest reason for their gaining this reputation has been the uncertain quality of the common bar iron turned out by competitors. It is among these latter manufacturers that the improvement in quality has been made to which we referred. It is not the righteous who are called upon to repent, but sinners. If, now, sinners realize the evil of their ways and resolve to lead virtuous lives, and a preacher then proclaims that the world is growing better, should any righteous man regard such a statement as a reflection upon his character?

Chicago Engineering Projects.

An unusual number of ambitious engineering projects are on the carpet in Chicago. Some of these are reasonably certain of being carried out, while others are likely to be delayed for a long time, if indeed they ever assume practical form. The World's Fair is, of course, responsible for some. Among these are the American tower, to be 1120 feet high; the elevation of the Illinois Central Railroad tracks for a mile or more in the vicinity of the World's Fair grounds, and the erection of a variety of structures of important dimensions for purposes connected with the exposition. Apart from the World's Fair, however, there are schemes of great moment for the improvement of the city. Prominent among these is, of course, the great drainage scheme, or ship canal, to run from Chicago to the Illinois river, which is fast passing through the preliminary stages and on which the work of excavation is expected to begin shortly.

The inadequate means of communication between the north and south sides of the city has long been a source of vexation to a large part of the citizens, and two methods of improvement are proposed by different sets of people. One is known as the May subway and the other as the Day elevated bridge. The advocates of the May subway propose to run a broad tunnel under the Chicago River, connecting the boulevard system of the north side with the boulevard system of the south side, thus not only avoiding the swing bridges over the river, but also avoiding the difficult task of traversing the crowded streets of the business center of the city. This tunnel or subway is expected to be brilliantly illuminated with electric lights and to be made as attractive as any drive or passageway above ground. It is estimated to cost \$1,500,000 and will be paid for by special assessments on property benefited.

The Day elevated bridge scheme is a private enterprise, also intended to connect the north and south boulevard systems, but by means of a bridge crossing the Chicago River at an elevation of 100 feet. It is proposed to construct a drive way and also to operate cars on this bridge after the style of the Brooklyn

Bridge. The projectors of this scheme contemplate the erection of a suspension bridge with its main towers 300 feet high, which are to be built of steel, furnished with elevators and used as observation towers. The impression of the public is that this bridge, if built, would be an important part of an elevated railroad system running north from the heart of the city, which is very badly needed.

Another engineering project which seems reasonably certain of being put under way is the Torrence terminal railroad system, proposed by Joseph T. Torrence, who is widely known in the iron trade. This is a plan for an elevated roadway to be built from the heart of the city to the outskirts and to be used in common by several railroads. General Torrence's plans comprise the erection of freight warehouses supplied with powerful elevators to enable freight to be more expeditiously handled than at present, and also to relieve the streets of the city of a great deal of the traffic which now uncomfortably crowds them. The Torrence scheme is in line with the growing sentiment in Chicago in favor of requiring all the steam railroads to elevate their tracks. The knowledge of the strength of this sentiment is animating projects of this character. The business of Chicago is becoming too great to be transacted on one level.

If only a part of these schemes meet with favor and are undertaken with vigor, Chicago will be the scene of a great deal of very interesting engineering work within the coming year which will greatly change both the appearance of the city and the methods now in vogue of transacting business. New trade centers will be created, new forces will be developed, and numerous factories will be obliged to change their locations to retain the facilities they now possess, but the growth of the city will be assisted and accelerated, conveniences will be secured which are now wanting, and Chicago will be more than ever the wonder of the world.

The Importance of Corn Exports.

Indian corn at the time of the famine in Ireland proved invaluable as a substitute for potatoes, and the idea of sending commissioners to Germany to popularize the use of this kind of grain where there is a scarcity of rye was well conceived. There is no reason why corn exports this year should not be on an enormous scale and go far toward mitigating the distress caused by short crops in the United Kingdom and on the Continent. Our corn crop this season, it is now calculated with some degree of exactness, will exceed 2,000,000,000 bushels. It is relatively cheap, as compared with wheat, and is not only nourishing, but palatable, when treated according to the most approved New England methods, especially in combination with rye. Few are aware that the exports of corn from the United States last year exceeded 100,000,000 bushels, and that they very nearly approximated in quantity the aggregate shipments of wheat and flour, the latter having been but little in

excess of 109,000,000 bushels. Corn exports were the largest that had ever taken place, which fact is mainly accounted for by the low price then prevailing—a fraction less than 42 cents a bushel. Corn enters so largely into domestic consumption in the various forms known as farinaceous food, and is depended upon by farmers to such an extent for the use of animals, that a surplus for export would naturally exist only in years of greatest abundance. It is invariably noticed in the produce market that pork products of all descriptions, as well as meats in general, vary both in quantity and price with the available quantity of corn.

For reasons above suggested, corn is chiefly valuable for domestic consumption, and only by some unusual concurrence of events, such, for example, as grain scarcity abroad and great abundance at home, could corn exports of any considerable magnitude, compared with other cereals, be expected. The decided preference for other cereals now manifested in Europe must first be overcome, either by a removal of existing prejudice or as the result of a distressing lack of food. Fortunately for those who are in want, and especially so for those who possess abundance, such an extraordinary concurrence now exists, and the interesting spectacle is presented of the most powerful and prosperous of the republics of the New World advancing to the relief of the suffering inhabitants of the Old World, when other means of succor seem to have almost failed. Last year one-half of our exports of corn went to Great Britain. This year there will be a wider diffusion, and for the sole reason that it is relatively cheap, when compared to wheat, rye, oats and to other cereals which Europeans are accustomed to use. Cheapness is an essential condition if the export trade in corn is to be placed on a permanent basis.

The relatively high price of corn at the present time, as compared with previous years, cannot be regarded altogether with complacency. Spot corn in the New York market is now quoted about 70 to 72 cents per bushel, against the average selling price of 42 cents in 1890. An advance of 30 cents a bushel, could it be realized, may mean millions to American farmers, but a comparatively limited trade at prices well nigh prohibitory would prove to be fallacious in final results. An avaricious grasping for more money, and the putting into practice of the arts of the professional speculator, actuated by this spirit—taking advantage of distress in Europe—would be consummate folly. It is well to heed the lessons of the past. As an indication of the prospective enormous grain movement when the crop of maize is matured for shipment, a Philadelphia paper publishes a list of 148 tramp steamers already chartered to load grain at Atlantic ports, which have an aggregate capacity of 18,392,000 bushels. And yet if every one of these steamers should load a full cargo of corn the total shipments would not equal 1 per cent. of the crop.

The Chicago, Burlington and Quincy Railroad Company have just published their September earnings. The statement

shows that the deficit existing up to the end of August has been wiped out, giving way to a surplus of nearly \$179,000. Here is at once an explanation of the stringent economy enforced by Western railroads in purchasing materials and a promise of the better times coming. This great railroad system was run absolutely at a loss the whole of the first eight months of this year. Few roads have done much better, while many have done far worse. How could they be expected to buy large quantities of rails and add largely to their rolling stock under such circumstances? But now the financial position of this and other roads has shifted and again their revenues exceed their expenses. The gain shown in September will be greatly increased during the remaining months of this year and will be continued far into 1892.

The smoke nuisance is more of a nuisance in Chicago at present than ever before known. At one time, thanks to the efforts of a vigilant and fearless smoke inspector, there was a decided diminution in the volume of soot flying in the air, and the prospects of still greater improvement were as bright as the sunlight which was then occasionally experienced by the denizens of Chicago. But early this year partisan politics was permitted to exercise its baneful influence, the efficient inspector was forced to give way to one of the opposite political faith and now all that had previously been accomplished appears to have been lost. There is, it is true, a pretense of enforcing the anti-smoke ordinance, and occasionally an offender is fined, but the work is not prosecuted in a vigorous way and the old pall of smoke overhangs the whole city, pollutes the air and soils everything with which it comes in contact. But a year since, and Chicago was being visited by officials of other cities to see how the suppression of the smoke nuisance was being accomplished. To-day the city is a most excellent example of "how not to do it." Within a block of the smoke inspector's office there are chimneys which vomit clouds of black smoke all day long, like volcanoes in a state of chronic eruption. The Chicago authorities need to bestir themselves actively if they propose to have a fairly clean city during the year of the World's Fair.

There is a disposition in some quarters to fix the responsibility for the present unsatisfactory condition of the iron trade on *The Iron Age*. It is claimed that the very cheerful opinions expressed in these columns in August and September influenced many owners of iron works to adopt a wrong policy. Believing that a boom was imminent, they increased the output of pig iron so as to be able to take advantage of the rising tide, which was expected to float them to marvelous prosperity. Hence the huge production of to-day, which is plainly in excess of the requirements of the trade and should be reduced. Owners of bar mills and other manufacturers of finished iron sold ahead sparingly lest they should find the market

suddenly higher with no chance for them to take advantage of it, and the consequence is that to-day the mills are seeking orders rather anxiously and making extremely low prices. It is somewhat flattering to *The Iron Age* to credit it with so much influence upon the trade, but greatly as we would be pleased to be able to exert it, modesty forbids the acceptance of the apparent compliment. The promise of greatly increased business was too plainly perceptible in August or September to be confined to a single newspaper. The demand was not only expected but it was being felt, and if owners of blast furnaces became unduly exuberant over the outlook it was due to a number of influences then co-operating. These influences, however, are still existent and have lost none of their force by the passage of time, but must, on the contrary, gain in strength until this depression, which is only temporary, becomes a merely unpleasant memory.

Defense of the Atlantic Coast.

Gen. O. O. Howard, in his annual report as Commander of the Department of the East, devotes considerable space to the problem of the defense of the Atlantic Coast. He says:

In the northern part of my department there has been provided to be completed according to annual appropriations, such fortified points, viz: Boston, New York and Hampton Roads. The next point to receive attention, recommended by the Board of Fortification, is New Orleans, where there is to be established a dry dock and naval repair station. New Orleans properly fortified gives us one strong point on the Gulf of Mexico. At least one more such fortified port will eventually be necessary on the Gulf, and probably two—say Galveston and Tampa Bay. But in the Atlantic, south of Hampton Roads, we are actually defenseless. There are too many cities on this part of the coast to expect to fortify them all; but as far south as possible we should fortify a good harbor, the deepest we can find, to be a refuge for commerce endangered, and to constitute a naval coaling and repair station.

I recommend the complete defense of the combined harbors of Tybee Roads, Savannah, and Port Royal Sound, Broad River, by works on Tybee, Hilton Head, Parry and St. Helen Islands, with fixed torpedo boats as accessories. This would at once protect the most prosperous city in our Eastern quarter, and render safe the best harbor south of Hampton Roads, and furnish the naval base desired. The Navy Department has already begun the construction of a dry dock opposite Port Royal on Barry Island. Having this object in view, I recommend that the necessary land be obtained, and further, that steel guns be mounted as soon as practicable in order that the artillery forces stationed in the South may have a practice ground better than that furnished by the obsolete material at Barrancas. As soon as the harbor begins to be properly fortified the artillery regiment stationed in the South can be gradually transferred to permanent quarters on Parry Island, and Fort McPherson be partially garrisoned by infantry, and so held for refuge for all troops on the Gulf or the South Atlantic Coast in time of epidemics. With the present limited number of artillery troops, I believe the manning of the defenses of New Orleans, Port Royal and Tybee Roads to be all that the army can properly provide in the South.

CORRESPONDENCE.

Kirkaldy's Book.

To the Editor: It will hardly be denied that the book recently published under the title of "Strength and Properties of Materials with Description of System of Testing," written by W. G. Kirkaldy, the son of David Kirkaldy, issuing as it does from the Kirkaldy Testing Works and giving numerous reports of results of tests made during nearly 30 years, is entitled to careful consideration. This must be the case more particularly because in the preface the author states that his father has criticised and reviewed each statement and deduction before allowing it to stand as printed, thereby impressing upon it the weight of his experience and opinion. Moreover, as the book is said to give the *resumé* of over 27,000 tests of different kinds, and covers nearly the whole field of the art, it will always be regarded as one of reference for engineering constants.

It is a handsomely printed work, octavo, of over 200 pages, containing an immense amount of information in the form of reports and a large number of plates and curves beautifully engraved. The last section contains an engraving of David Kirkaldy in 1875, followed by a historical sketch of his many trials and tribulations. It is written in such a virulent and disagreeable manner that this part had better be ignored entirely by a reviewer. It is unfortunate that such old stories are again brought out and ventilated. The book in its general appearance as to binding and typography is a very creditable production of a well-known house, Sampson, Low, Marston & Co., and would be an ornament in any library. There is a complete table of contents and a voluminous index for ready reference, which are very well arranged. Whether the contents are of such nature as to insure popularity and general introduction will be determined by a closer scrutiny of the information given.

The title on the first inside title page is as given above, while on the back is printed the following title: "Kirkaldy's System of Testing, with data upon Strength and Properties of Materials." Section I carries the title "Description of Building and Contents." These several titles would lead one to suppose that the most important object of the work is a description of the systems of testing, and of the methods and means employed in the Kirkaldy Testing Works. Instead of this we find absolutely nothing of the kind, but are given an extended enumeration of the many cases of broken specimens in the museum, without description or illustration in detail of any of the many interesting pieces. In the entire book there are three references to testing machinery. One merely states that there is a testing machine, and two others, pages 37 and 65, say that elongations are measured by Kirkaldy's patent micrometers.

Even the description of contents of building in general is meager and unsatisfactory. This seems to be intentional, since in Section 2 the explanation is made that "it is not the intention to teach others how to make tests, . . . but for the purpose of letting engineers and others know in a general way how the work is carried out, and especially so that they may the better understand and appreciate the contents of the series of reports and plates, &c., &c." Now, as these latter contain David Kirkaldy's observations during 25 years, and his conclusion No. 49, page 212, says that it is possible to compare tests only when all surrounding conditions are known, it seems strange that he does not insist that his son, in such a work, give in a most complete manner all methods and means by which the results were obtained. Failing in this he must permit the readers

of the book to put as much or as little faith in the facts and opinions given as they may deem proper. The failure of the author to give this important information makes many of the figures given incomprehensible. It is stated, page 24, that elongations of iron are measured after every increase of load of 1000 pounds, and in the case of steel after every 2000 pounds increment, but no explanation or reason for such procedure is offered, nor is the method of measuring mentioned. It is equally inexplicable why he should observe the permanent set after application of loads of 30,000, 40,000 and 50,000 pounds per square inch, irrespective of whether these loads are above or below the elastic limit. The utility of these observations is neither explained nor demonstrated.

Heretofore it was generally believed that Kirkaldy had adopted certain standard shapes for test pieces, but the author rudely destroys our faith by giving all sorts of dimensions and shapes which do not bear any particular relation to anything. In one particular alone does he mention a standard—viz., the 10-inch length of test piece used for determining elongation, but then for wire tests he has changed this to 5 inches (page 38). However, Plate XXIV gives the sketch of a test piece with long conical fillet (like German Standard) with gauge marks put $\frac{1}{2}$ inch on the conical parts, while they should always be on cylindrical body to obtain correct elongation. Referring to table F it will be seen that the cross sections of test pieces bear no relation to original shape and are not alike among themselves, while the length is always the same.

Investigations extending over a lifetime do not seem to have taught Kirkaldy that results of tests are proportional only when all dimensions of test pieces are so; otherwise, when making tests on rounds and squares of all commercial sizes the cross sections and lengths of test pieces would have varied in some definite proportions, and also proportionate to the original dimensions of rolled bars (see reports E and F and page 62). This is most clearly indicated by tests of full-size bridge links (eye bars) as given on page 67 and reports O and P, where he mentions that "because bars had a section too large for the capacity of the testing machine they were in some cases planed down in thickness, while in others shaped on the edges to a narrower width;" then all of these are reported, together with similar but smaller bars, broken by the machine without reducing original section. Neither of these bars was so reduced that the remaining cross section was similar (proportionate) to original or to the other bars. Again, page 199 and Plate XIII, tests Nos. 1697 and 1699, the author reports and plots two tests of pieces different in diameter—viz., 2.75 and 1.12 inches—cut from a propeller blade, and explains that the difference in results and curves is due to the effect of cooling of thinner or thicker material. He fails to make allowance for effect of differences in cross section of test pieces, the dimensions of which have been adopted, not to adhere to established standards, but arbitrarily, as the rough strips or blocks permitted. The author claims (page 38) that the "10 inch length was until recently" the adopted standard, in spite of the fact that everywhere on the Continent the 200 mm. (8 inches) length had been in use for years, and had been definitely adopted as the standard in 1884, which he describes (page 38) as an "absurd length."

Furthermore (page 37) we are told that in testing stone cubes of different sizes are used for different qualities, and from the fact that these sizes vary with resistance, we are led to believe that the capacity of the machine was the sole guide as to di-

mensions, precisely as was the case with cement tests. In the latter he uses a very large section, probably because his large machine would not give equally reliable results on smaller pieces, and he adheres to his dimensions in spite of the fact that uniform standards of smaller section have been adopted wherever cements are tested. Kirkaldy has not yet accepted the sand-cement briquettes which have been adopted universally, but adheres to his original neat cement tests. Inasmuch as the reports giving results of cement tests contain little information about source or composition of materials tested, and tensile strength varies from .0 pounds per square inch to maximum obtainable, they have little value for practical purposes.

The sketches representing test pieces show no dimensions, and the description of each shape is incomplete. The kinds of tests made are merely enumerated and include all the ordinary tests of wood and metal, and a few extraordinary ones, such as the "bulging test." However, Kirkaldy does not mention the freezing and absorption tests of cement and stone, and it is to be assumed that they are never made at his testing works. The methods of making any of these tests are nowhere described.

The book contains numerous admirably arranged tables and reports, but they lack detail, and hence lose much of their value. The kind, grade, source or composition of materials is rarely given, and hence the results cannot be used by practical men who handle particular makes of metals and cements alone. About these tables and reports the author says, page 59: "It is very important that all reports be complete and detailed, and this is kept in view when preparing original or manuscript reports. . . . The author trusts that the following examples of reporting will be found by those who examine them to contain evidence of accuracy and details, &c., &c." and on page 66, referring to reports N, O and P, and diagrams made therefrom claims them to be "exactly as in manuscript reports, giving detail nature and method of recording experiments of this class." Upon examining these reports closely it is found that the figures given would indicate the values of E (modulus of elasticity) for steel to vary over 30 per cent. In tables C and D six cases are given in which a load of 60,000 pounds per square inch (about 6000 pounds below elastic limit) shows a set of 0.00 inch, while in table D is found a thrusting test in which the elastic stress (limit) is found at 68,000 pounds per square inch, while under a load of 100,000 pounds per square inch the depression is recorded as 0.0 inch per inch of length. Evidently there was something wrong with the measurements in these cases. Furthermore, in Table S (transverse tests) are found several instances where 6, 8 and 10 inch steel beams, 10 and 20 feet between supports, again show permanent deflections of 0.000 inch under loads of from 25,000 to 40,000 pounds.

Then, comparing the diagrams with the figures given in the reports, we find that curves shown are interpolations at the most interesting points, at the elastic limit and after the maximum load has been passed. Thus on Plates IV, V and VI, and others drawn from reports N, O and P, the curves between the elastic limit and yield point are drawn not from observed loads and to corresponding elongations, (for the tables contain no figures to represent these, giving merely one observation below and one above these two points), but by freehand.

In the case of that part of the curves beyond the point of maximum load, the author draws a straight vertical line, because, as he asserts, page 197, "there is no drop of load after maximum," and "moreover, it may be stated that in the greater

proportion of tests, properly carried out, there is practically no diminution of stress before fracture; even in the most marked or extreme cases of softness the backward tendency or reduction in stress is after all but a very insignificant amount, a mere tithe of what it is represented to be by some; and what little there is can be satisfactorily accounted for." The fact is that with a proper machine a drop of load of from 20 to 40 per cent. is always readily observable after the maximum load has been passed.

Returning to the manner of reporting, the author says, page 62, under report E, referring to ductility, "the total is also expressed per the fractured area . . . the iron that comes out highest in this column will be best for practical purposes;" and then under report F it is stated "the stress per fractured area is not inserted . . . as it is unnecessary . . ."

The only difference between the tests in the two reports E and F is that in the former are omitted observation of elastic limit and the set at that point and at three points beyond it, which are given in the latter. This "stress per fractured area" is omitted, although the author says, page 209, "Kirkaldy attached great importance to contraction of area, and still adheres to his proposition that that is the best factor for ascertaining ductility, and ought never to be left out of account."

In some cases the tables are arranged as to elastic limit, while in others as to the result obtained by dividing maximum stress by area of ruptured section, while page 67 reports N, O and P, contraction of area in all these notably demonstrates this factor to be very irregular and anomalous. Instances of similar contradictions abound throughout the book and it would be useless to enumerate them. The author's opinions in many cases are not based on facts, as when he says, page 69, reports U and V, that the iron in the Hammersmith Bridge links had not changed during more than 40 years' constant use; for he never tested any of these links when they were made, and the fact is a well-known one that when some of these very links were taken to Scotland to be used in a temporary structure, many of them broke during unloading.

We are told that Kirkaldy decided while building his celebrated machine that autographic diagrams would be useless and unsatisfactory, and hence did not construct apparatus therefor in connection with his machine, although such had been designed. Now without having used such apparatus he condemns it unconditionally, and insists that diagrams such as he gives be accepted instead, when no person having any knowledge of testing would accept them as representing correctly the behavior of the material.

Many other points which are palpably incorrect could be selected which cannot be added to a review. It may, however, be stated that the book also contains David Kirkaldy's original 66 conclusions, about which is said, page 210, "It is with great satisfaction that it can be stated that not one of these 66 conclusions (made in 1863) requires to be retracted or even modified;" while it is well known that conclusions Nos. 5, 15, 18, 19, 20, 21, 22, 27, 28, 33, 55 and 61 are partly or totally wrong, especially when stated without reserve or limitation. Will any engineer believe that we have learned absolutely nothing new about iron and steel in more than 25 years?

The book is certainly a most remarkable one in that it gives a wonderful amount of facts, figures and opinions collected during more than 25 years of great activity and yet contains little of importance that has not been published elsewhere. It seems to have for its object three principal aims—namely, to advertise David Kirkaldy and his famous testing works, to

vindicate its founder against accusations and imputations never made, and to express his dislike of technical school laboratories and competitors.

GUS C. HENNING.

Washington News.

(From Our Regular Correspondent.)

WASHINGTON, D. C., November 3, 1891.

On Saturday last it was expected that the President would be in the party on the dynamite cruiser *Vesuvius*, which ran down to Indian Head to witness the first of a series of test trials of armor plates of American make and treated by American processes. The President found himself so overrun with public business at the hour named that he abandoned the trip, but will probably be present at the next firing, in about a week. There was, however, a distinguished company assembled, among the number Secretary Tracy, Admiral Kimberly, Commodore Folger, Chief of Ordnance; several Senators of the Committee on Fortification and Ordnance, a representation of military and naval *attachés* of sundry foreign legations, including Chili, and the following gentlemen representing the establishments where the plates were manufactured: Carnegie Works—W. L. Abbott, general manager; J. A. Porter, superintendent, and Lieut. C. A. Stone, U. S. N. Bethlehem Iron Company—R. W. Davenport, assistant superintendent; W. H. Jacques, ordnance engineer, and Lieut. J. F. Meigs, U. S. N. Mr. Harvey, son of the inventor of the successful method of treatment known as the Harvey process, and his superintendent, Mr. Dickenson. The Army Ordnance Bureau was represented by Captains Birney and Taylor. The rest of the company was composed of army and navy officers and a few members of the press.

The series of tests for the day comprised three treated plates 3 x 6 feet and 10½ inches thick and weighing about 10 tons. Each plate rested against a backing of 3 feet of white oak timbers, and were as follows:

No. 1. High (0.38 per cent.) carbon nickel steel from the Bethlehem Company.

No. 2. Low (0.25 per cent.) carbon nickel steel from Carnegie, Phipps & Co.

No. 3. Low carbon steel, treated by the Harvey process. The proportion of nickel in the plates was about 3½ per cent.

The projectiles used for the angle penetration were Holtzer shots 100 pounds weight, 17½ inches long, 6 inches caliber, velocity 2075 feet per second when it struck the plate, distance 57 feet. There were 12 of these shots fired from a 6-inch gun, and pointed to strike each plate about 2 feet from each corner. When each corner of each plate had received a shot a 15 ton 8-inch gun was dragged into position by a yoke of peaceful looking oxen, for the purpose of delivering a center shot of a Firminy steel projectile, 210 pounds weight, 22 inches long, ejected by 74 pounds of powder, with a striking velocity of 1750 feet per second, distance 54 feet.

The firing lasted from 8 a.m. until 3 p.m., with the following results:

Plate No. 1, high (0.38 per cent.) carbon (3½ per cent.) nickel steel, two of the 6-inch and the 8-inch shells rebounded about 50 feet, having penetrated the plates and backing to a depth of 9 to 13 inches. Another shell, 6 inches, was impaled in the plate to a depth of 9 inches. The base of the shell was broken off. This plate at the corner beneath showed a crack 10½ inches deep. The shell, however, which caused this damage was broken into fragments by the contact. This plate showed three cracks, one of which was ¾ inch wide from the upper left corner to the center.

Plate No. 2, low (0.25 per cent.) carbon (3½ per cent.) nickel steel, received its punishment with better results. The two 6-inch shells fired at the upper corners penetrated until their bases were 11½ inches and 9 inches from the face of the plate, while the 8-inch shell buried itself flush with the surface of the plate. The lower corners exhibiting greater resistance left one 6-inch shell with 2½ inches protruding, while the other rebounded leaving an indentation 13½ inches. This plate displayed but a single unimportant crack extending from the right upper corner to the center.

Plate No. 3 (Harveyized) presented some interesting results and was badly damaged. It displayed some ugly fractures. Two of the 6-inch shells were shattered, having penetrated but a few inches. Another 6-inch shell penetrated and bulged into a spherical shape, indicating immense resistance. The remaining 6-inch shell was firmly impaled at a depth of 10½ inches. The 8-inch projectile was the culminating surprise, as it penetrated the armor completely and penetrated the oak backing and appeared on the other side. It was 46 inches from the point of the shell to the base of the target thus displaying that amount of penetration. This plate suffered worse than the other two, but none of the cracked pieces became detached.

Commodore Folger remarked that the high-carbon nickel steel of the Bethlehem Company furnished less penetration than the plate of last year which was a success at every round. The performance of the Carnegie low-carbon steel was a favorable surprise, as so much was not expected of it. The Harvey plate was the most severe on the projectiles.

The Commodore added that the results must be studied out scientifically, but on the whole are satisfactory and demonstrate the ability of the United States to make armor which will compare with the best produced abroad. The object being to prevent penetration, it is believed that the nickel steel plate treated by the Harvey process will produce the best results. The tests on Saturday were more severe, and results vastly superior to anything abroad.

The two remaining tests will comprise five plates—one high-carbon nickel steel; one low-carbon steel, Harveyized; one low-carbon nickel steel, Harveyized; one high-carbon nickel steel, Harveyized, from Carnegie's works; one high-carbon nickel steel, Harveyized, from the Bethlehem works.

The *attachés* of foreign legations were manifestly surprised at the results. From their manner and tone of conversation among themselves, they saw better results than had been accomplished in their own countries.

Testing a Double-Screw Ferry Boat.

—Last Saturday the new double-screw ferry boat Bremen of the Hoboken Ferry Company was tested. This boat differs very materially from the Bergen, in which a triple-expansion engine drives a screw at each end of the boat. Each engine of the Bremen has its cranks set at 180° and the two engines, in relation to one another, have their cranks at 90°, insuring a perfect balance. The Bremen also differs in having her pumps driven by special engines, while the pumps of the Bergen are driven by the main engine, which she is compelled to keep in action while in her slip to insure vacuum. The tests were made by Profs. J. E. Denton and D. S. Jacobus of Stevens Institute. The boat made the run to Newburg at the rate of 13½ miles per hour.

The contractor says the Broadway cable road is practically finished. The work has been in progress six months. Much remains to be done at the power stations and in other essential particulars before transportation can begin.

STEEL CAR AXLES.—I.

BY P. KREUZPOINTNER, ALTOONA, PA.

Hardly any other structure carrying a heavy weight is subject to such a variety of stresses and strains of varying intensity as a railway car axle. Transverse, torsional and tensile strains, shocks, blows and vibrations, due to an often unequally distributed load, running at various speeds over an uneven roadbed, try a car axle most severely. On account of the severity of service and the serious consequences resulting from the breaking of a car axle while on the road, it is but an act of self-preservation to exercise the greatest care and caution in selecting the material out of which car axles are to be made. Steel only is considered in this paper as the proper material for car axles, because iron, being a simpler metal, is better known, and because steel, being the metal of the future, it is well to become thoroughly acquainted with its properties and behavior. Moreover, at present steel for axles has received a more or less severe set-back in some quarters, which does not seem warranted by facts. It is most natural that a change from iron to steel axles should not find smooth sailing and the progress of steel be marked by periods of retrogression, the same as was experienced when steel was introduced for steam boilers.

Ere long the question with the engineer will not be whether or not he shall use steel for car axles, but what qualities of steel are best suited for the purpose.

The intelligent steel maker can do a good deal to promote a more rapid introduction of steel axles for railway service. When we consider that there are 1,100,000 freight cars, 23,500 passenger and 18,000 baggage and other cars to be provided with axles, and that the renewal, due to wear and tear, requires about fourteen new axles per annum per 100 cars*, then we can comprehend the magnitude and importance of this item to the steel trade, and that it "pays" to devote close attention to the quality of steel required for axles. All the more so since increase in carrying capacity of cars and greater speed tends to enhance severity of service. If the question of most suitable quality of steel for axles is once thoroughly understood, it will be found that under prevailing conditions steel for axles will be the best as well as the cheapest metal in the long run.

In starting out to inquire into the proper quality of steel for car axles it is well to keep before our mind the ideal conditions which we expect to find in a structural material—namely, such a perfection in the quality of the metal employed as to allow us to reduce the sectional area of our structure to the smallest possible dimensions consistent with the necessary strength to carry the required load safely. In practice this ideal has not been and never will be reached, but he is the most successful steel maker and engineer who comes nearest to it. It is probably due to the want of proper appreciation of the presence and importance of qualities in the steel other than those revealed by the ordinary test which has caused so-called "mysterious" breakdowns, resulting, in some cases, in abandoning steel and returning to iron axles, though it would probably be difficult to give reasons why an iron axle made of unsuitable iron, as is the case often enough, should give more satisfaction than a steel axle made of unsuitable steel. There are plenty of disastrous failures of iron axles on record, yet engineers did not jump at the conclusion at once that iron is "no good" for axles.

They had nothing else to fall back upon, forcing them to search for the cause of failure, while with steel it was different; they had iron to resort to.

Starting with a chemical composition of carbon, 0.25 to 0.35; manganese, 0.55 to 0.65; phosphorus and silicon as low as possible, the interesting question arises, Shall we take Bessemer or open-hearth steel for our axles? Since converter metal for boiler plate is looked upon by many as a failure, so much so that it has retarded, especially in some European countries, the introduction of steel for structural purposes, it would seem a precautionary measure to weigh carefully the points in regard to Bessemer metal for car axles. Want of uniformity, due to its method of production and the presence of oxides, making the metal "dry," seem to be the causes operating against the successful use of Bessemer metal for boiler plate, or for such structures as are subject to the varying influences of heating and cooling.

That steel can be made in the Bessemer converter equal in quality to the best open-hearth steel has often been demonstrated. But the higher cost of production of steel of first-class quality in the converter seems to prevent its successful competition with open-hearth steel for certain structural material. Whether this difference in the quality of the steel produced by the two processes will eventually disappear is a question to be solved by the steel maker. The larger mass of metal we have in a car axle no doubt eliminates or modifies to a large extent the causes which seem, at present at least, to operate against the successful use of Bessemer steel for boiler plate. However, even in the case of steel for axles, until the consumer has proof that Bessemer steel is made uniformly as good as the better grades of open-hearth steel, the consumer of axles will prefer to have passenger car, tender truck and locomotive driving-wheel axles made of open-hearth steel.

Mechanical Treatment.

Next to the proper grade of steel for car axles it is very essential that the mechanical treatment of the steel for axles be such as not to deteriorate its quality. Much mischief may be done by a careless and improper treatment of the steel for axles by unequal heating and forging. In axles thus treated carelessly a difference in strength of from 4000 to 7000 pounds per square inch and of 10 per cent. in elongation may be found within a distance of 2 inches. It will not always do to charge this difference to liquation in the steel. The reasons why careless mechanical treatment may tend to injure the uniformity of steel for axles are found in the difference of structure in the body of an axle carelessly forged. The structure of steel is coarsely crystalline in the ingot. Subsequent hammering and heating breaks up the crystals and produces a fine "grain." This being the case, there must necessarily be various grades of fineness in the structure of the steel while being worked between the ingot and finished axle. If, then, one portion of an axle receives more or less work or more or less heat than another portion, we can easily understand why there should be a difference in the structure of an axle, and, therefore, in strength, in different parts. The latter will vary directly with the amount of work. The well-known effects of heating and hammering on steel furnish us with endless examples of what we may expect to find in a car axle under the conditions mentioned. In other words, we may find a difference of structure in every foot of length in a carelessly treated axle, a condition not by any means imaginary.

It may be argued that each of the individual portions in an axle, though varying from one another, is strong enough for the purpose it is intended for. This may be

true, but we have to deal with another disturbing factor before we are permitted to let this argument pass. Where the structures of each varying portion of the steel meet each other, where they slide into one another, there cannot but be a disturbed molecular state of the mass composing the steel, a want of cohesion of the particles such as is necessary to produce the maximum strength of the steel. But want of cohesion indicates weakness at the line of demarkation, hence a steel axle may really be below the required strength, though each of the portions, differing in structure from one another, may be of ample strength individually. It is well to bear the foregoing in mind when the manner of testing axles is considered. Segregation of the steel, hard spots, due to poor mixing, excessive local hammering, unequal heating—all tend to produce want of uniformity of structure and its consequent evils.

The custom, sometimes followed, of heating the end of an axle red hot in order to straighten the journal is a most reprehensible one. Unless an axle so treated is annealed afterward, this unequal heating produces a different structure at every inch from the heated end to where the axle remained cold. Especially is that portion brought to a dangerous condition where the red heat turns into what is called black or blue heat and from there to the cold. The injurious effects of blue or black heat on steel are now well recognized, and these effects do not disappear altogether when the steel is cold. That portion in an axle remains more or less brittle, with its qualities to resist dynamic forces, shocks and blows seriously impaired. If one could search the early private records of axle tests at mills, the repeated quotation, "journal end flew off at second or third blow," would probably be found conspicuous for its presence, due to this obnoxious heating of the ends only of axles. Blow holes in steel axles should be carefully avoided. Steel is a dense, crystalline mass, with the crystals adhering to each other by their sides mechanically, not through chemical affinity. Any force, therefore, greater than the cohesive force which holds the individual crystals in their places, will have a tendency to separate them.

This separation takes place along the sides of the crystals where they adhere together. The freer the mass of the steel from oxides and other impurities the greater the cohesion, the greater the force necessary to overcome the cohesion. It is this crystalline form and the mechanical adhesion of the crystals with their respective sides, thus forming a continuous cleavage plane, as it were, through the steel, which makes steel break easier than iron, if any injury on the circumference or a flaw in the interior separates any two or more crystals. If such a separation has once taken place it does not require a very great force, as we all know, to break steel, because the structure of steel permits and favors the continuance of the separation of two crystals from crystal to crystal along their side, similar to the cleaving of sandstone. It is this also that makes blow holes, "dirt" spots, oxides and flaws so objectionable in steel axles. When squeezed together and drawn out by the hammering or rolling of the ingot, these imperfections in the steel are very apt to act like a wedge to separate the adjoining crystals and thus cause gradual or sudden fracture, according to circumstances. Indeed, axle and tire breaks have, almost invariably, their beginning in such an imperfection, caused by defective work in the mill. Millmen deceive themselves very much if they think they can escape the consequences of careless furnace work for any length of time by ever so much hammering or "doctoring" of tires and axles.

Railroad service is a most effective application of the law of the survival of the fittest.

* Railroad Gazette, September 20, 1880.

fittest to axle and tire makers. Nor should the engineer deceive himself, and think blow holes, flaws or "pipes" are not objectionable, because they are in the center of an axle, shaft or tire. If such imperfections were round and smooth on the inside, with no projecting sharp jags or corners sticking their noses between the nearest crystals, then such a feeling of security would be justifiable. The violent blows and shocks, and often long-continued vibrations, tend to "fatigue" the metal, and then the internal defects put in their work. At an unfavorable moment such defects, whether external or internal, follow the line of least resistance, and a crack, perhaps so small as to be invisible to the eye, is the consequence. Alternate heating and cooling of a structure of this class aggravates the evil. For this reason it has been suggested to bore out the center of large shafts in order to remove all traces of "piping" and thus avoid the cracking of the shaft from the inside out. The injurious effects of the defects mentioned are also aggravated whenever internal strains prevail in a steel structure. Unequal cooling from a high heat or unequal hammering produces inequality of structure, which leaves the metal in a state of tension.

Throwing red-hot axles on the wet ground, or, worse, into a puddle of water, or piling them where winter winds and snow or rain strikes them is therefore to be avoided, as causing internal strains.

Originally good steel may be turned into inferior axles by too light hammers. This is very apt to be the case where forges equipped for iron work only engage in hammering out steel billets for axles. To see a fine piece of steel intended for an axle maltreated between an old-fashioned light helve hammer and a still lighter anvil jumping 2 inches off its base with every stroke, is painful. No wonder the axle inspector is puzzled why these axles break so "funny." If we take a cross section of such a maltreated "funny" axle we find a comparatively raw center—a neutral half-worked zone and a hard-hammered, very fine grained outer shell of about $\frac{1}{4}$ or $\frac{1}{2}$ inch in thickness. No wonder such an axle breaks "funny." Any one not knowing the reason why might jump at the conclusion that such an axle was case hardened.

The foregoing partially illustrates the importance of proper mechanical treatment of a steel axle, next to selecting the proper grade of steel. In a sense, mechanical treatment is even more important because a well-worked, well-annealed axle of uniform structure, without blowholes, flaws and internal strains, though somewhat too hard or too soft, involves less risk than one with the objectionable defects mentioned. The official report of the German State railways for 1889 on tire breaks gives us a valuable pointer as to what we have to avoid in axles. The report says:

"Among the principal determinable causes of tire breaks during the past year (1889) we find 1312 tire breaks, or 31.34 per cent. of the total number of tires broken, due to unsound, porous, 'dirty' defective material." Comment is unnecessary.

Frank K. Esherick of the firm of Esherick & Cotton of Philadelphia, died in that city on the 15th ult., in his 38th year. Mr. Esherick had an unusually wide circle of acquaintances in the iron trade and the kindred interests, having commenced his business life with Morris, Wheeler & Co. in 1869, remaining with them until 1883, when he commenced business on his own account as Esherick & Kelton, which firm was succeeded by Esherick & Co., and subsequently by Esherick & Cotton. Mr. Esherick was thoroughly acquainted with all the details of his business, which combined with

strict integrity and genial manners won him many friends, especially through the Middle and Western States.

Topical Questions.

The following list of topical questions has been prepared for the New York meeting (November 16) of the American Society of American Engineers:

89. Has any one ever tried to standardize sizes for keys? If so, what are his sizes?
90. Have you had any experience in outdoor work at night, in wind and storm, with portable apparatus for light in large quantities, other than electric light?
91. What is the best design for line shafting, transmitting over 50 horse-power, permitting them to be stopped and started on any floor, without interfering with the motor or other shafting?
92. What is the best method of correcting for the superheating of steam in figuring a boiler test?
93. In arranging chimney stacks for a battery of boilers, it is best to use one for each pair, or a larger chimney for the entire battery?
94. Will there be any difference in the size of the chimneys required, when the boilers are the ordinary tubular type, or of some of the water-tube forms?
95. What is the best form of cylinder lubricator for engines carrying 140 pounds of steam pressure or over?
96. What are the maximum safe speeds for hoisting and traversing in an overhead traveling crane in a machine shop?
97. Is there any advantage in using a circulating device for the water inside a boiler, particularly of the three-furnace Scotch form?
98. Is there any best way to group the tubes over the cylindrical furnaces of a Scotch boiler?
99. Will a forced circulation of air under a floor near the ground prevent decay of the wood work and floor timbers?
100. Why should any one cut a $\frac{1}{2}$ -inch bolt with 12 threads to the inch? Is there any objection to the U. S. Standard of 13 threads?
101. Have you any facts to show that there is a molecular change in metals when their temperature is raised or lowered?
102. Have you any data as to earth work dams which would suggest the factor of safety with which they have been built?
103. What have you found is the best form of straightening machine?
104. Have you had any experience with systems for purification of bad feed water before it gets into a steam boiler, either by precipitation or otherwise?
105. Is it better or not to have the lead increase with the load in high-speed automatic engines, and if so, why?
106. Are there not advantages to be claimed for a medium amount of back pressure and high compression lines in the same class of engines?
107. Has any one tried sand blasting as a method to produce a surface on cast iron before nickel plating?
108. Is there any better method than japanning to protect steel from corrosion?
109. What kind of wheel is best for grinding and beveling glass plate? What is the best surface speed?
110. Which is the best process to repair old files—sand blasting, etching or recutting? Do any of them really pay?
111. Is there any reason why diametral pitch should not be used for very large gears, instead of circular?

Ground has been broken at Roanoke, Va., for the plant of the Cushman Iron Company. The building will be 75 x 45 feet, with boiler and engine room additional.

MANUFACTURING.

Iron and Steel.

The laborers and turn men employed at the blast furnaces in the Shenango Valley have been granted an increase in wages, the laborers receiving an advance of 10 cents per day and the turn men 15 cents per day.

The turnbuckle department of the Central Iron and Steel Company, Brazil, Ind., was partially destroyed by fire on the morning of October 30, resulting in a loss of about \$10,000. It is the intention of the company to rebuild the works at once, and men are now at work clearing away the ruins, so that work may be commenced immediately. The works, it is expected, will be ready for operations in about a month. All orders for turnbuckles will be promptly filled, as a large stock of finished buckles was on hand, and a large number in process of manufacture were saved, not being damaged. Temporary arrangements are being made to complete those unfinished when the fire occurred, so that the trade may be supplied without delay during the rebuilding of the plant.

The new Minneapolis Rolling Mill, but recently completed, was burned on the 29th ult. The damage is estimated at \$12,000, covered by insurance. The machinery is believed to have been but slightly injured, and the mill will soon be rebuilt.

The Damon Safe and Iron Company of Boston are announced as having decided to locate at Waukegan, Ill., where they will complete and occupy the plant started by the late Chicago Safe and Lock Company.

The Washington Nut, Lock and Bolt Company of Washington, Pa., have secured a charter, with a capital stock of \$10,000. The directors are: John E. Stewart, Midway; John I. Carson, West Alexander; E. A. Dunlap, Coon Island; J. W. Murry, W. I. Campbell, J. W. Hindman and J. E. Allum, Washington.

The Joliet Sheet Rolling Mill Company propose to erect at Joliet, Ill., a plant for the manufacture of iron and steel sheets. The general manager of the enterprise will be Samuel Fewtrill, an expert roller, who has for many years been connected with the Joliet Steel Works. At a meeting held last week in Joliet many of the prominent business men of the city were in attendance, and subscribed liberally to the stock of the company. A site comprising some 20 acres has been secured in a favorable location, and from present appearances the scheme seems very likely to be carried out. There is a large and steadily growing market in the Northwest for thin sheets, and the time is ripe for the occupation of the field by local manufacturers. Other enterprises in this line have been brewing for some time in the vicinity of Chicago, but as yet they have not assumed sufficiently definite shape to be mentioned. They are, however, of such a character as to cover the entire range of sheet products.

The Slatington Rolling Mill Company of Slatington, Pa., are meeting with gratifying success, and although they have only just completed their first year, have secured an excellent business, especially in iron for bridge and structural work. Besides making improvements on their 16-inch mill, they are putting up an additional building, and to facilitate loading have laid a railroad track completely around the mill, which will carry the finished bars direct from shears to cars.

Furnace A of Carnegie Bros. & Co., Limited, at Bessemer, Pa., has been dismantled and will be replaced by a new stack.

The new muck mill of the Monongahela Iron and Steel Company, erected at Hays Station, on the line of the P., V. and C. Railroad, a few miles from Pittsburgh, was put in operation last week. For the present only muck iron will be manufactured, but it is the intention of the company later on to manufacture bar iron.

No. 2 furnace of the Carrie Furnace Company at Rankin Station, near Pittsburgh, which has been out of blast for two months for relining and other repairs, was blown in on Monday, the 26th ult. The work of relining the furnace and making the repairs was executed by McClure & Amsler, engineers and contractors, Bissell Block, Pittsburgh, Pa. This firm also supplied the stoves for both No. 1 and No. 2 furnaces when they were erected, No. 1 having three stoves, while No. 2 has four. These stoves are of the Massick & Crooke design, and McClure & Amsler are the sole agents for them in this country.

Marshall Bros. now operate their furnace at Newport, Perry County, Pa., under the corporate title of the Juniata Furnace and Foundry Company. The company have not yet erected

the foundry, but the furnace is now running wholly on foundry iron, which is sold as a special softener. The company state that the iron contains from one-quarter to three-quarters of 1 per cent of metallic aluminum, which naturally makes it dense and close. The iron is sold by analysis and not by fracture.

Frank C. Roberts of Philadelphia is preparing plans for a new blast furnace of the Pottsville Iron and Steel Company, of which W. Atkins is president.

In this column last week the statement was erroneously made that the Kemble Furnace at Riddlesburg, Pa., had been sold at sheriff's sale to Adolphus Snedberg of New York, trustee, for \$5750. We are advised by Wm. Lander, general manager of the Kemble Iron Company, Riddlesburg, who operate the Kemble Furnace, that the property sold was the lands of the Riddlesburg Coal and Iron Company, with which the Kemble Company have no connection whatever. There are two Kemble stacks, one of which is actively engaged in producing foundry and forge pig iron.

Last week we referred to the Eagle Rolling Mill Company as having been recently incorporated at New Ulm, Minn. The item should have read the Eagle Roller Mill Company, who are merchant millers at the above place.

The Springfield Architectural Iron Works, Springfield, Ohio, are converting the premises immediately opposite their present plant, occupying space 120 x 130 feet, into a foundry and pattern shop. The rapid growth in the demand for their productions—wrought-iron fencing, cresting, architectural iron work and lawn mowers—has necessitated this step.

During the double turn beginning last Wednesday morning, the actual rolling time being 19 hours and 50 minutes, the Rolling Mill Department of the Stanley Works, Bridgeport, Conn., rolled as follows:

140,063 pounds $2\frac{3}{4}$ x 11 gauge.
1,700 pounds $2\frac{3}{4}$ x 8 gauge.
3,000 pounds $2\frac{3}{4}$ x 12 gauge.

Total, 144,763 pounds = 64 1408-2240 gross tons. This was done on their 12-inch train, and the record is considered quite a good one by Albert N. Stanton, superintendent of the rolling mill department.

An addition, 150 x 100 feet, designed for the manufacture of Bessemer steel castings, is being added to the plant of the Sharon Steel Casting Company, at Sharon, Pa.

The new Embreeville blast furnace, at Embreeville, Tenn., has been completed and will be blown in about the middle of December.

No. 4 blast furnace of the Pennsylvania Steel Company, Steel, Pa., which has been idle for several months undergoing repairs, has been blown in.

Sarah Furnace at Ironton, Ohio, is being repaired preparatory to going in blast.

The Eagle Iron and Steel Company of Ironton, Ohio, have applied for a charter to operate the old rolling mill at that place.

The Knoxville Furnace and Mining Company have been incorporated at Knoxville, Tenn.

D. R. Lean, engineer and contractor, Pittsburgh, Pa., has just closed a contract with the Haugh-Kurtz Steel Company of Indianapolis, for the erection of an open-hearth steel plant, which they will build on their property at Anderson, Ind. For the present only one 15-ton open-hearth furnace will be built. Mr. Lean also has a contract for furnishing the necessary iron buildings, boilers, hydraulic machinery, pumps and railroad approaches.

During the month of October, just closed, there was produced in the 119-inch plate mill of the Homestead Steel Works of Carnegie, Phipps & Co., Limited, Homestead, Pa., 4800 tons of finished plates. This record has been excelled only once before, the product for October, 1890, being 5200 tons. This firm have just filled an order for 300 tons of plate furnished to the Standard Oil Company for the purpose of being used in the construction of oil tanks in the new oil field recently opened up at McDonald, Pa. The tanks were made by Riter & Conley of Pittsburgh. The plates furnished are known as Nos. 4 and 6 gauge and weigh 9.68 and 8.25 pounds to the square foot.

Machinery.

John F. Pollock, James M. Loring and Charles A. Loring have incorporated the Acme Motor and Machine Company of East St. Louis. The capital stock is \$500,000.

The Bethlehem Foundry and Machine Company's shops at So. Bethlehem, Pa., are running to their utmost capacity, and it is stated that the company contemplate erecting new and larger works in order to meet the demands of trade.

One firm recently ordered 18 large water wheels of James Loffel & Co., Springfield,

Ohio. A large wood-pulp mill now under construction in Wisconsin will use these water wheels. This new enterprise is situated near large quantities of suitable timber and where ample water power can be obtained.

Last week 350 machinists, brass finishers and laborers in the employ of the Westinghouse Air Brake Company at Wilmerding, Pa., received notice that after Friday, the 30th ult., their services would not be required. The reason given for the suspension of the men was a lack of orders and the increased facilities for production of the new plant as compared with the old. In making the suspension the firm discriminated in favor of employees who had purchased property from them in Wilmerding and built homes. This property was sold to the men on long time payments and it is but natural that they should protect their own interests by retaining the men who are indebted to them.

Announcement is made that negotiations have been concluded with the Derwent Foundry Company, by which that concern will erect a plant at Elwood, Pa., for the manufacture of stoves and light castings. Elwood is a new manufacturing town located about 30 miles from Pittsburgh, and interested in it is Henry W. Hartman, Merritt Greene and other well-known capitalists of Pittsburgh.

The Westinghouse Machine Company and Westinghouse Electric and Mfg. Company of Pittsburgh are now manufacturing the first combined engine and generator for street railway service. In size they run from 100 to 500 horse-power. As yet none of the machines are used, but the Minneapolis Street Railway Company propose to use them, and have just placed an order 100 200 horse-power machines.

Hardware.

B. S. Bosworth & Co., manufacturers of nails, East Taunton, Mass., are intending to add new machinery, thus giving them in increased facilities.

The Economist Plow Company, South Bend, Ind., are preparing to build a \$5000 brick addition to their factory to meet the demands of their constantly increasing business.

Nicols & Dean are about to commence the manufacture of hardwood materials for wagons, carriages and buggies at St. Paul, Minn. The new factory, 40 x 150 feet in dimensions, which is being erected will employ about 50 men, the force being increased as the business warrants.

Miscellaneous.

The property of the defunct Chicago Wire Goods Company of Aurora, Ill., was sold on the 28th ult. to the Amazon Woven Cordage Company of Boston for \$35,000, and the sale was confirmed by the court on the following day. It is announced that the purchasers expect to reopen the factory and manufacture wire cable.

The Raymond Lead Company, Lake and Clinton streets, Chicago, are manufacturing an anti-friction metal which is meeting with much favor in the trade. It is known as Raymond's aluminum copper, and is claimed to be a perfect self-lubricator adapted for use in bearings of all kinds. The Raymond Lead Company are large manufacturers of metals, and have had long experience in their manipulation. Their expert knowledge fits them peculiarly to meet the requirements of machinery manufacturers and users desiring high class anti-friction metal. Their advertisement appears in another part of this issue.

The great East street shops at Springfield, Ohio, built by William N. Whiteley at a cost of \$1,500,000, were sold to Scott Bonham, a Cincinnati attorney, for \$200,000.

The Tin Stamp Works of Ball Brothers at Muncie, Indiana were burned October 28; loss \$52,000.

Last week in the courts at Pittsburgh a bill in equity was filed by Florence C. Miller, asking for the appointment of a receiver for the Dexter Spring Company. Mr. Miller is a stockholder in the company, and stated in his petition that the capital stock of the company is \$100,000, and its indebtedness \$82,000. The company he further states is insolvent, the late president, Theo. Doerflinger having fraudulently appropriated \$13,600 of the company's money. After hearing the evidence and examining the papers, the petition was granted, the court appointing Sam'l Lewis as Receiver.

The factory of the United States Mine Supply Company, at Cleveland, Ohio, has been destroyed by an explosion, resulting in the total destruction of the building and the death of three employees and the serious injury of four others.

Creamer & Scott Company, Indianapolis, Ind., announce that after October 29 their address will be Milton, Wayne County, Ind., their stock and machinery having been removed to their new plant at that point. The

company state that the capacity of the new plant will more than double that of the old, thus enabling them to handle promptly their increasing trade. They also call attention to the conveniences and facilities for shipping which are secured by their removal. The line of vehicles manufactured will be much enlarged and will include phaetons, surreys, spring wagons, buggies, light driving wagons, &c.

The Hoyt Metal Company of St. Louis, Mo., have completed a new factory at Arlington, N. J., which they will shortly occupy.

Mr. Hubbs, whose proposition to establish a shipbuilding plant at San Diego, Cal., was noted in this column last week, asks a bonus of \$150,000 in cash and \$450,000 in property.

Trade Publications.

FROM THE C. W. HUNT COMPANY of 45 Broadway, New York, we have received three pamphlets illustrating and describing coal machinery, railways and manila rope. The first deals with the machinery for handling coal, and first describes the automatic railway used for unloading vessels and carrying coal or similar material back on a wharf. It is a gravity road requiring neither steam nor other power, is entirely automatic; the loaded car runs down the track without an attendant, unloads at any point, and returns to the loading point. It costs no more to store coal 200 to 500 feet back than it does to dump on the front of the wharf. Next is the elevator for hoisting material from a vessel. Then are described steam shovels, cable railways, machinery for carrying materials, hoisting engines, screens, chutes, buckets, &c. The second pamphlet describes steam and electric locomotives, the several types of track, switches and turntables, and platform and box cars. The pamphlet on manila rope for transmission and hoisting is very interesting and instructive. It gives, first, a description of the manila fiber and the method of manufacturing the rope. Next is a plainly illustrated article on splicing. All the most useful knots are shown and their several advantages mentioned. The last portion of the pamphlet deals with the important question of rope transmission from a practical standpoint.

AN INTERESTING, handsomely-printed pamphlet issued by the H. C. Frick Coke Company of Pittsburgh will possess considerable interest for iron foundries. It describes briefly and well the mining of coal and the manufacture of coke in the famous Connellsville district, in which the Frick Company own 36,000 acres of carefully-chosen coal lands and possess 10,000 ovens with a daily capacity of 20,000 tons of coke. The pamphlet gives directions for charging cupolas and the construction of the latter to obtain the greatest melting power.

THE KENTUCKY FIRE BRICK COMPANY, with works and offices at Portsmouth, Ohio, also works at Indian Run, Lewis County, Ky., have just received from the press the second edition of their 1891 catalogue, a handsome quarto volume of 50 pages bound in cloth, profusely illustrated with engravings of their productions. The company invite especial attention to a new system of blocks for blast furnace purposes which they are offering, and to which they refer as follows: Many blast furnacemen prefer heavy blocks for blast furnace purposes, although it has been impossible to secure them "repressed," while others have preferred the "9 x 13 1/4 inch" system because it could be had "repressed," the repressing imparting a fine mechanical shape to the brick as well as a degree of firmness and hardness unattainable in any unpressed brick, though a very important feature when such brick was to be used for blast furnace work. This difficulty, the company state, has been overcome in a system of blocks which they are offering similar to the "9 x 13 1/4 inch" system, but of heavy blocks which they have succeeded in repressing with a pressure of 50 tons, or about ten times the pressure given to smaller brick, of granite-like hardness, yet possessing all the fire qualities of the best Kentucky flint clays; in other words, combining all the advantages of a "9 x 13 1/4 inch" system with those of the heavy block, in addition to the great increase of pressure impossible to attain in the former.

The furnace of the Norton Iron Company, at Ashland, Ky., is being relined preparatory to being blown in as a Bessemer pig producer.

TRADE REPORT.

Philadelphia.

Office of *The Iron Age*, 229 South Fourth St.,
PHILADELPHIA, Pa., November 3, 1891.

The tenth month of the year has closed, with prices of Iron and Steel averaging the lowest of any within that period, and with some the lowest that has ever been known. Under such conditions it is somewhat anomalous to talk of better times being near at hand, when, if prices may be taken for a guide, they distinctively point to impoverishment. But that by no means represents the actual feeling in the trade, although they are beginning to realize more fully than ever that the country has had a narrow escape from disaster, and that the process of recuperation will be more protracted than was generally expected. Nevertheless, this is not a time for despondency, but the reverse, as the oft-promised and long-looked-for improvement is surely within reasonable distance. There are times when predictions of this kind need to be qualified by an if or a but; the only qualification required at this time, however, is that we may have to wait a little while longer than was generally expected. The conditions are all favorable, the crops are large and safe, they are bringing good prices, with a demand beyond the most sanguine expectations. The only mistake appears to have been in expecting to find the money in circulation too quickly. The trust and loan Companies are beginning to get a good deal of their money back, but it has not had time to be re-invested. The railways are earning a great deal more money than in previous years, but their floating debts are larger, and before they can spare anything for equipments and renewals old scores have to be settled, and so on all the way through. In some parts of the country a good deal of liquidation has been going on among mercantile and manufacturing establishments, so that the period for expansion has barely been felt as yet. Business is in a perfectly healthy condition, nevertheless, and while there is nothing to indicate much, if any, improvement this year, it will probably develop very rapidly during 1892. There is some disappointment felt in this city that at the Baldwin locomotive Works it has been found necessary to discharge about 1000 of their hands. They have been turning out 20 locomotives weekly, with a force of about 4500 hands, but they hope and believe that business will pick up again soon. At the Cramp shipyards 3000 men are at work with orders aggregating \$15,000,000 in value. At the saw works of Henry Disston & Sons business is said to be picking up in all departments, with indications of a very heavy demand during the coming year. They have at present between 1800 and 1900 hands on their pay roll, and are running full time. Other large establishments report a fairly good business, but as a rule not to the extent that was generally expected, although they are all figuring on something very heavy in the near future.

Pig Iron.—There is no material change from last week, and as a rule favorite brands are easily placed at quoted rates. Other descriptions are in full supply and can be had on pretty liberal terms, particularly for spot cash, although it cannot be said that there is any unusual pressure. Prices are so low that holders recognize the fact that even fractional concessions involve actual loss, so that unless there is some special necessity for realizing, stocks are permitted to accumulate; but as a rule local furnaces are delivering quite as much iron as they make; some, in fact, are run-

ning behind, with very little prospect of catching up until on toward the holidays. All the same, there is plenty of Iron; the only trouble is to get the right grade at the right time and at the right price. As to the latter, there is a wide discrepancy. Some brands of No. 1 Foundry command \$17.75 @ \$18, delivered, and some Mill Irons \$15 and upward, but in ordinary transactions prices run 50¢ to 75¢ below these figures. Everything depends on what a consumer requires—if special brands, special prices; if new or unknown brands, special prices are again required, but in such cases the seller must offer the inducement, not the buyer. In regard to the outlook, there is nothing in sight likely to affect values in either direction. In some respects things look rather weak for deliveries during the next 60 days, but, as we have already intimated, this is more on brands or grades that are not particularly wanted at any time than on those that are in regular use. General quotations remain nominally as before, varying according to brand, terms of settlement, point of delivery, &c.

Ohio Softeners, No. 1x	\$19.00 @	.....
Ohio Softeners, No. 2x	18.00 @	.....
Standard Penna. No. 1x	17.75 @	\$18.00
Standard Penna. No. 2x	16.25 @	16.50
Medium Penna. No. 1x	17.25 @	17.50
Medium Penna. No. 2x	16.00 @	16.25
Virginia, No. 1x	17.00 @	17.25
Virginia, No. 2x	15.75 @	16.00
Standard Neutral All-Ore Forge	14.25 @	14.75
Ordinary Forge Cinder-mixed	13.50 @	14.00
Hot-Blast Charcoal	20.00 @	22.00
Cold-Blast Charcoal	24.00 @	27.00

Muck Bars.—No improvement either in price or demand. Holders are pretty firm, nevertheless, at from \$26.50 to \$20.75 delivered, or \$26 @ \$26.25 at mills; a few choice makes held at higher figures.

Steel Slabs and Billets.—There is quite a pressure to sell for this year's delivery, and even for the first quarter of the coming year very low figures have been quoted. As a rule consumers are well supplied for the near future, but occasional transactions have been reported for fair-sized lots at about \$26.50 for Susquehanna Valley deliveries, or \$27, seaboard or Schuylkill Valley points. The market cannot be called either active or strong, and low as prices are there is very little disposition to place orders, unless to cover early requirements.

Steel Rails.—There are a good many inquiries, and manufacturers are beginning to realize that a heavy demand will be met with in the near future. The vice-president of one leading concern informs us that they have more business under negotiation than they have had at any time within two years, and that while there is no immediate pressure of orders, they keep comfortably employed, with a reasonable certainty of great activity during the coming year. Meanwhile prices are quoted firmly at \$30, at mills, for either winter or spring deliveries.

Bar Iron.—Market just about fair. There is no actual scarcity of work at any of the leading mills, but they have not as much on their books as they would like to have, neither are prices near what they ought to be. There are no orders of special importance on the market at present, so that it seems likely enough that present conditions may prevail for some time longer. Meanwhile sales are being made at 1.70¢ @ 1.75¢ for best refined Bars, at city mills and 1.60¢ @ 1.65 for deliveries at interior points.

Skelp Iron.—Demand light, with only a few unimportant transactions at about 1.75¢, delivered, for Grooved and 1.85¢ @ 1.90¢ for Sheared.

Plates.—Demand is somewhat active for small lots, but there is nothing large enough to do more than keep the mills steadily employed, with, perhaps, two to three or four weeks' work ahead of them. Consequently prices have no chance for

improvement, as every order is competed for with the utmost avidity, and in some instances, it is said, without much regard to cost. Ordinarily prices are about as follows, but concessions of $\frac{1}{10}$ ¢ to $\frac{1}{20}$ ¢ are readily secured on good-sized lots:

	Iron.	Steel.
Tank Plates	1.90 @ 2.00¢	2.00 @ 2.10¢
Refined	2.20 @ 2.30¢	2.10 @ 2.20¢
Shell	2.30 @ 2.40¢	2.30 @ 2.40¢
Flange	3.20 @ 3.30¢	2.50 @ 2.75¢
Fire-Box	4.00 @ 4.25¢	3.00 @ 3.50¢

Structural Material.—There is quite a large amount of business looming up in the future, but no great amount that can be considered as immediately available. Meanwhile some of the mills are quite busy; others are running irregularly, as they are depending to a great extent on orders that come in from day to day. Prices are about as last quoted, but not very strong, especially for immediate specifications. Angles, 1.95¢ @ 2.05¢; Sheared Plates, 1.90¢ @ 2¢, and in some cases about $\frac{1}{10}$ ¢ more for Steel, according to requirements. Tees, 2.5¢ @ 2.6¢; Beams and Channels, 3.1¢ for either Iron or Steel.

Sheet Iron.—There is nothing of interest in this department. Mills are running full and disposing of most of their output, but the demand has not been up to expectations. Prices are steady and for best makes are quoted as follows:

Best Refined, Nos. 14 to 20	3.00¢ @ 3.10¢
Best Refined, Nos. 21 to 24	3.10¢ @ 3.15¢
Best Refined, Nos. 25 to 26	3.20¢ @ 3.30¢
Best Refined, No. 27	3.40¢ @
Best Refined, No. 28	3.50¢ @
Common, $\frac{1}{4}$ ¢ less than the above	
Best Soft Steel, Nos. 14 to 20	3¢ @ 3 $\frac{1}{4}$ ¢
Best Soft Steel, Nos. 21 to 24	3 $\frac{1}{4}$ ¢ @
Best Soft Steel, Nos. 25 to 26	3 $\frac{1}{2}$ ¢ @
Best Soft Steel, Nos. 27 to 28	4¢ @
Best Bloom Sheets, $\frac{1}{4}$ ¢ extra over the above prices	
Best Bloom, Galvanized, discount	@ 67 $\frac{1}{2}$ %
Common, discount	@ 70 %

Old Material.—Market very dull, and sales hard to make unless to some one needing material at once. Prices are nominally unchanged, but the market is limited, and any extra pressure for business would involve more or less of a break in prices. Ordinary asking figures are about as follows: Iron Rails, \$21.50 @ \$22.50; Steel Rails, \$17 @ \$18, delivered; No. 1 Railroad Scrap, \$20.50 @ \$21, Philadelphia, or for deliveries at mills in the interior \$20.50 @ \$21.50, according to distance and quality; \$14.50 @ \$15.50 for No. 2 Light; \$14 @ \$14.50 for best Machinery Scrap; \$13.50 @ \$14 for ordinary; \$14.50 @ \$15.50 for Wrought Turnings; \$10 @ \$10.50 for Cast Borings, and nominally \$23 @ \$25 for Old Fish Plates, and \$16 @ \$16.50, delivered, for Old Car Wheels.

Wrought Iron Pipe.—There is some talk of a better market in the near future, but as yet it is more in anticipation than in actual fact. Competition for business is unusually keen, and in the urgency to secure it extra discounts of 5 % or more are not unusual. Ordinary quotations are about as follows:

Butt-Welded Black	57 $\frac{1}{2}$ %
Butt-Welded Galvanized	47 $\frac{1}{2}$ %
Lap-Welded Black	67 $\frac{1}{2}$ %
Lap-Welded Galvanized	55 %
Boiler Tubes, 2 $\frac{1}{2}$ inch and under	52 $\frac{1}{2}$ %
Boiler Tubes, 3 to 6 inch	60 %
Boiler Tubes, 7 inch and larger	55 %

Edward Corning & Co. of 29 Broadway, New York, and 70 Kilby street, Boston, have established an office at 237 South Third street, Philadelphia. They will represent in this market the Allentown Rolling Mills, the Lebanon Iron Company and others, and will make a specialty of Structural Shapes, Plates, Bars, Bands, Rivets, Spikes and Railroad Fastenings. Their offices are connected with the mills and with each other by long-distance telephones.

Chicago.

(By Telegraph.)

Office of The Iron Age, 59 Dearborn street, CHICAGO, November 4, 1891.

Dullness has settled down upon the market generally, and it is expected to continue in this condition for the remainder of the year. People are at this early day talking of the disinclination of buyers to lay in stocks of goods, because they will want as light an inventory as possible in December. If there were any snap to trade there would be no thought of this. There are nevertheless some encouraging features to report. Orders for Steel Rails are being placed for next year's delivery, and the indications favor a much larger business of this character than for several seasons. Grain is moving eastward freely. Last week the receipts at Duluth were over half a million bushels in excess of any former week's record in Duluth's history. This means a great increase in the purchasing power of the Northwest, and it is already manifesting itself in the payment of past due interest by farmers. Farm mortgage companies report numerous debtors paying four years' interest now and promising to cancel their entire indebtedness in the spring, which will certainly bring a large amount of money into the market for reinvestment. The winter coming may be hard on some branches of manufactures, but those who can stem the tide until spring will surely see a great change in the condition of trade.

Pig Iron.—Sellers of local Coke report light sales with but little business in sight. Consumers are apparently of the impression that prices are going lower, and those who need Iron are holding off now in the hope that a little later they will be able to do better. Meanwhile quotations are quite firmly maintained, as all the makers have a good part of their output under contract. The demand for Southern Coke is irregular; some houses report very little business, while others seem to be making fair sales, especially those whose quotations are lower than for corresponding grades of local Irons. Some favorite brands of Gray Forge are a little higher. Lake Superior Charcoal shows no improvement, although transactions are reported ranging from carloads to 800 tons, and inquiries are coming forward for round lots; sellers are more numerous than buyers, and every order is the subject of brisk competition. Reports are current that \$17 is being shaded, but thus far no definite statements are made to show that this is actually the case. The depression in Charcoal Iron is at last having an effect on the makers and several furnaces have been blown out in the Lake Superior district. No other action can relieve the market in the absence of a good demand. Quotations are as follows, f.o.b. Chicago:

Lake Superior Charcoal.....	\$17.00 @	\$17.50
Local Coke Foundry, No. 1.....	15.50 @	16.00
Local Coke Foundry, No. 2.....	15.00 @	15.25
Local Coke Foundry, No. 3.....	14.50 @	15.00
Local Scotch.....	16.00 @	16.50
Ohio Strong Softeners.....	17.75 @	18.25
Southern Coke, No. 1.....	15.75 @	16.25
Southern Coke, No. 2.....	15.00 @	15.25
Southern Coke, No. 3.....	14.25 @	14.50
Southern, No. 1, Soft.....	15.00 @	15.75
Southern, No. 2, Soft.....	14.00 @	14.75
Southern Gray Forge.....	14.00 @	14.50
Southern Mottled.....	13.50 @	14.00
Tennessee Charcoal, No. 1.....	18.00 @	18.50
Alabama Car Wheel.....	20.00 @	21.50
Coke Bessemer.....	17.00 @	17.50
Hocking Valley, No. 1.....	17.00 @	18.50
Jackson County Silvery.....	17.50 @	18.00

Spiegel—Several sales of Spiegel have been effected at \$28 and \$38 for 20 % and 30 %.

Bar Iron.—Business in this line is flat. The stoppage of the local mills has not been felt in the least, but outside manufacturers report orders very scarce. The demand from car builders falls much be-

low expectations. The Ohio Mills quote 1.55¢ @ 1.60¢ at mills, half extras, but 1.70¢ Chicago is being shaded on specifications at all desirable.

Structural Iron—Contracts have been let for the erection of two large office buildings, 14 and 16 stories high, which will require several thousand tons of beams and Steel Columns, in all probability to be furnished by Carnegie, Phipps & Co. Business is still quite dull and prices are unchanged.

Plates.—Mill representatives are lively, endeavoring to drum up trade, but without success. They quote carload lots of Steel Plates at Chicago, as follows: Tank, 2.10¢ @ 2.12½¢; Shell, 2.30¢ @ 2.35¢; Flange, 2.50¢ @ 2.60¢. Store trade is irregular, but those who have large stocks have quite a good trade with consumers desiring immediate shipments. Prices from stock are well maintained.

Sheets.—Jobbers report a better demand for Black Sheets, caused by the colder weather. They continue to quote 3.20¢ for No. 27, but concessions are made according to circumstances. Mill agents find their trade dull at present, but are not pushing sales, as the mills are busy on old contracts. They quote about 2.95¢, Chicago, from mill. Galvanized Iron is as active as last week, and manufacturers are unable to fill orders fast enough. Junita is quoted from stock at 1.60¢ @ 1.65¢.

Merchant Steel.—The Soft Steel trade is quiet, but without change in prices. Those who advanced the rates a short time since are holding up to the figures then made.

Track Supplies.—In Steel Rails quite a considerable tonnage has been entered for next year's delivery. Now that the ball has opened it is expected that the railroad companies will quite generally anticipate their requirements, as inquiries are increasing. Quotations are maintained at \$31.50 @ \$33. Splice Bar orders are more plentiful. Sales are made at 1.85¢ @ 1.87½¢ for Iron. Track Bolts are quoted 2.75¢ for Hexagon Nuts, and Spikes 2.20¢ @ 2.25¢.

Old Rails and Wheels.—Old Iron rails have been more active, and several sales have been made at about \$22, Chicago, for delivery at Western mills. Some demand is noted from Ohio mills, but at prices lower than prevailing here. Old Steel Rails are lifeless, but nominally quoted \$14 @ \$16. Car Wheels are rather steady at \$16, with a fair demand.

Scrap.—Business continues very light, some dealers report not a single sale for the week. Quotations are unchanged, as they represent asking prices, viz.: No. 1 Railroad Forge, \$19; No. 1 Forge, \$18; No. 1 Mill, \$13.50; Fish Plates, \$21.50; Car Axles, \$23.50; Horse Shoes, \$18.50; Light Iron, \$8.50; Machinery Cast, \$12 @ \$12.25; Stove Plate, \$8.50; Cast Borings, \$7 @ \$7.25; Wrought Turnings, \$9.50 @ \$10; Axle Turnings, \$12.50; Mixed Steel, \$10.50; Coil Steel, \$14; Leaf Steel, \$15; Tires, \$15.50; Malleable Cast Scrap, \$9.50.

Metals.—The decline in all Metals is a feature of the week; carloads of Lake Copper are now quoted 12½¢, while casting brands can be had at 11½¢ @ 11¼¢. Dealers report an active trade in the latter. Spelter is lower, through sympathy with other metals, and is now selling at 4.75¢. The decline in value of Pig Lead continues. There is not a great deal of metal available, but the demand is light. There have been sales in a limited way at and around 4.05¢ @ 4.10¢, spot and futures.

The South Chicago works of the Illinois Steel Company turned out 34,338 tons of Steel Rails in October, which is stated to be the largest month's output of any rail mill in the world.

Cincinnati.

(By Telegraph.)

Office of The Iron Age, Fourth and Main Sta., CINCINNATI, November 4, 1891.

Pig Iron.—For the most part the week has been a quiet one in Iron circles. One sale of 9000 tons Mottled and Gray Forge was reported, mainly for forward delivery and at an advance on current prices, which remain the same as before. There was also a sale of 5000 tons of Bessemer Iron effected here, but indicates nothing regarding this market. Other sales were mainly in one to five cars and for current or early future deliveries, making the aggregate a little short of 20,000 tons. Southern Standard Car-Wheel Iron is comparatively scarce, and some furnaces ask an advance, but there are offerings at old prices sufficient to supply the current wants of consumers. The demand for Tennessee and Alabama Charcoal Iron is only moderate, and there are ample offerings. No. 3 Foundry Iron has sold to a fair extent at \$10.50, at the furnace, but 25¢ @ 50¢ more than this is asked, and is claimed to have been obtained for deliveries running into June next. The consumption of Southern Iron is apparently keeping pace with the enlarged production. Iron Pipe works have been the largest purchasers during the week, and their output of product is steadily increasing. The market as a whole seems to be in a healthy condition, although some buyers claim to be able to obtain round lots for the first half of next year at prices current for early deliveries. Collections are generally improving, and as a whole are satisfactory, although there are some delinquents. The money market here has become quite easy for prime borrowers. Quotations unchanged as follows:

Foundry.		
Southern Coke, No. 1.....	\$15.25 @	\$15.75
Southern Coke, No. 2.....	14.00 @	14.50
Southern Coke, No. 3.....	13.25 @	13.50
Ohio Soft Stone Coal, No. 1.....	16.50 @	17.00
Ohio Soft Stone Coal, No. 2.....	15.50 @	16.50
Mahoning and Shenango Valley.....	17.00 @	17.50
Hanging Rock Charcoal, No. 1.....	20.00 @	21.00
Hanging Rock Charcoal, No. 2.....	19.00 @	20.00
Tennessee and Alabama Charcoal, No. 1.....	16.50 @	17.00
Tennessee and Alabama Charcoal, No. 2.....	15.50 @	16.00
Forge.		
Gray Forge.....	12.75 @	13.00
Mottled Neutral Coke.....	12.25 @	12.50
Car Wheel and Malleable Irons.		
Standard Southern Car Wheel.....	19.25 @	19.75
Hanging Rock, Cold Blast.....	25.00 @	26.00
Lake Superior Car Wheel and Malleable.....	18.75 @	19.25

Cleveland.

CLEVELAND, November 2, 1891.

Iron Ore.—Transportation rates are again advancing and very little Ore is being sold. The receipts of Ore during the past week have amounted to only 20,000 tons, as compared with 53,000 tons for the corresponding week in 1890. There has been no change in selling price, and, indeed, there is likely to be none until the navigation season closes. Very little Ore remains unsold and it would not be surprising if, when the boats tied up, there were less than 100,000 tons of Ore not already disposed of on the docks. Shipments to the furnaces continue unusually heavy; 40,000 tons have been sent on from Cleveland during the past week, 5000 tons more than were forwarded during the same week last year. There is but little talk regarding next season's prices. The dealers are not anxious to force the opening of the market until there shall have been a substantial improvement in the Pig Iron market. The vesselmen now ask 85¢ @ ton for bringing Ore from Escanaba and \$1.40 @ ton from Ashland and Two Harbors.

Iron.—There has been no change in importance in the condition of the market. Dealers regard the situation as very unsatisfactory. The sales made have involved only scattering lots, and certainly at no increase in price over October quotations. The excitement incident to an important election has seriously affected local business, and very few dealers were at their offices to-day. Little improvement is looked for before the middle of the month. It is generally admitted, however, that a tariff victory to-morrow will infuse new life into the market. We hear of sales of No. 1 Foundry at \$16.25, delivered. Following are strictly local quotations:

No. 1 Strong Foundry, per ton...	\$16.20 @ \$16.70
No. 2 Strong Foundry, per ton...	15.20 @ 15.70
No. 1 American Scotch, per ton...	16.20 @ 16.70
No. 2 American Scotch, per ton...	15.20 @ 15.70
No. 1 Soft Silvery, per ton...	16.50 @ 17.50
Mahoning and Shenango Valley Neutral Mill Irons, per ton...	14.50 @ 15.00
Mahoning and Shenango Valley Red Short Mills, per ton...	14.50 @ 15.00

Old Rails.—The market is still quite firm, and we hear of sales at \$23.25 @ \$23.50 for Old Americans. The demand seems to be increasing.

Nails.—Prices are firm, and the demand, especially for Steel Wire Nails, is excellent. Quotations are unchanged at \$1.70 for Cut Nails and \$2 for Steel Wire Nails, in stock.

Scrap.—There have been some sales of No. 1 Railroad Wrought at \$19.50 per ton and of Cast Scrap at \$13.50 @ \$14, but the market is not very active even at these prices.

Manufactured Iron.—There is still an excellent demand for Common Bar at 1.65¢ @ 1.70¢, but the mills are so well engaged that little effort is made to crowd sales. In brief, the mills seem to have all they can do for the next two months.

St. Louis.

OFFICE OF *The Iron Age*, 214 N. Sixth st.,
St. Louis, November 2, 1891.

Pig Iron.—A fairly active business has been transacted in this metal during the past week. A number of sales are reported at "private terms," by which we are led to infer that prices generally quoted have been shaded. Gray Forge has been in active demand and \$13.25, f.o.b. cars here, is an average quotation for this grade. Some sales have been made for next year's delivery on the basis of prices ruling to-day, although as a rule furnacemen are not looking for this business, preferring to sell next year's product after January 1, at which time, as stated in this report on several occasions, higher prices are expected. It seems quite likely that their anticipations will be realized, as stocks on furnace banks are light and consumers have only been buying in moderate quantities for some six months past. The results of the large crops will then begin to make some impression on the general market, and with an easier money market the outlook will be considerably improved. For delivery during the next 60 days the following prices are asked, which are for cash, f.o.b. St. Louis:

Southern Coke, No. 1 Foundry, \$15.50 @ \$15.75
Southern Coke, No. 2 Foundry, 14.50 @ 14.75
Southern Coke, No. 3 Foundry, 13.75 @ 14.00
Gray Forge, 13.25 @ 13.50
Southern Charcoal, No. 1 Foundry, 17.25 @ 17.75
Southern Charcoal, No. 2 Foundry, 16.75 @ 17.25
Missouri Charcoal, No. 1 Foundry, 15.50 @ 16.00
Missouri Charcoal, No. 2 Foundry, 15.00 @ 15.50
Ohio Softeners, 17.75 @ 18.75

Bar Iron.—Mills are kept fairly busy on contract orders. New business is not very plentiful, although mills have enough to run them for some time yet. Prices are fairly well maintained, as follows: Lots

from mill on cars at East St. Louis, 1.75¢; small lots from store, 1.85¢ @ 1.90¢, according to quantity.

Barb Wire.—The volume of business is not large and mills are not running full. Prices continue unchanged, as follows: Painted, 2.70¢; Galvanized, 3.20¢; terms, 60 days, or 3 % discount for cash in ten days.

Wire Nails.—The demand has fallen off considerably and jobbers are only buying in very limited quantities. Prices have not changed any, although there is a weak undertone to the market which is making itself felt more strongly from day to day. We quote carload lots from mill at \$1.90 @ \$1.95. Jobbers quote from \$2.10 to \$2.15, according to quantity.

(By Telegraph.)

Metals.—The Pig Lead market continues in the demoralized condition noticed in last week's report. Desilverized is quoted at 4¢, but ordinary brands are easily obtainable at 3.90¢ for delivery during the present month, at which price several hundred tons have been sold during the past week. The market is very unsettled, and while prices are considered low in some quarters there are those who predict a still lower range of values. Consumers are buying in limited quantities to satisfy their immediate wants. No improvement in Spelter to note; the demand is light at 4.60¢, and the outlook for any improvement is not encouraging. Production continues unabated and unless the demand increases very materially within the next few weeks it is quite likely that Spelter will be bought at prices that will be considerably lower than those ruling to-day. Sales during the week have been light at 4.60¢.

Louisville.

LOUISVILLE, KY., November 2, 1891.

Pig Iron.—There has been no advance in prices during the past week, and but one large transaction, that of the Pipe Works, who bought several thousand tons of Mill Iron and Softeners for delivery during six to eight months, and prices not higher than \$10.50, furnace, for No. 3 Foundry. Among Southern furnaces one has over 40,000 tons of Gray Forge booked, and another has sold in two months' time over 70,000 tons. These companies, if cars could be obtained, would have very little Iron to offer for the coming year. Gray Forge is especially scarce and hard to obtain. No. 1 Foundry is being held and sold, in some instances, at \$12.50, furnace, but sales have been made at \$12. The position among Car Wheel companies in the South is such that any further heavy buying will cause an advance. It is reported that one of the leading Car Wheel companies have sold 9000 tons ahead, another 7000 tons, and that a meeting has been held and they have decided to offer no more Iron. One of the furnaces of the Clifton Company was burned down, so that they will hardly make as much Iron as was anticipated. At Anniston reports are made that they are sold up and that one of the furnaces will soon go out of blast. As the buying of Car Wheel Iron has been largely confined to St. Louis and one car company at Detroit, placing of further orders in the West will likely lead to strong prices for Car Wheel Irons. One sale East is reported at \$16.40, furnace, and a small

order taken upon same basis West. We quote for cash, cars, Louisville:

Southern Coke, No. 1 Foundry...	\$14.50 @ \$15.00
Southern Coke, No. 2 Foundry...	13.75 @ 14.25
Southern Coke, No. 3 Foundry...	13.25 @ 13.75
Southern Car Wheel...	18.00 @ 20.00

Pittsburgh.

Office of *The Iron Age*, Hamilton Building,
PITTSBURGH, November 3, 1891.

Pig Iron.—There has been a largely increased business in Bessemer Iron the past week, sales of over 20,000 tons having been reported, and while some of this was taken on speculation, part of it was bought by consumers. Some of this Iron was held by city furnaces for November and December delivery at \$15.25, but most of it was sold by valley furnaces at \$14.55, on cars at furnace, for November and December, and \$15.55, on cars at valley furnace, for 1892. The prices quoted are regarded as being very low, and it is this feeling, no doubt, that created the business above noted, and there are now but few sellers at the prices in question. A good many furnacemen are asking considerably higher prices than those noted. In regard to Forge Iron, the movement continues light, while prices remain unchanged. As it is now, consumers as a rule are refusing to buy beyond their immediate wants, notwithstanding they realized that it is very low at present prices, and affords the producer little or no margin for profit. Foundry Irons are also very dull, with but little prospect of any improvement in the demand until after the advent of the new year. Both stove and machine foundries are reported as being short of business at present. Prices may be fairly quoted as follows:

Neutral Gray Forge.....	\$13.65 @ \$13.75, cash.
All-Ore Mill	14.00 @ 14.50
White and Mottled.....	13.00 @ 13.50
No. 1 Foundry	16.00 @ 16.25
No. 2 Foundry	15.00 @ 15.25
No. 3 Foundry.....	14.50 @ 14.75
No. 1 Charcoal Foundry	21.50 @ 22.00
No. 2 Charcoal Foundry	20.50 @ 21.00
Cold-Blast Charcoal.....	25.50 @ 26.00
Bessemer Iron	15.25 @ 15.35

Muck Bar.—No improvement in demand and no change in prices, which are still fairly quotable at \$26.25 @ \$26.50, cash. There are very few buyers at present, as most of the mills are in position to turn out all they need, and some of them have considerable piled up for future use.

Manufactured Iron.—While possibly there is not so much new business, the mills generally have about all they can do, although it is admitted on all hands that prices are low. The mills in the Shenango and Mahoning Valleys are also busy, and prices there are fully \$1 per ton higher than they were three months ago. There has been an unusually good demand for Bar Iron, and the mills are well supplied with orders. City made Iron is still quoted at 1.70¢ @ 1.75¢ for Bars; 2.05¢ @ 2.10¢ for Plate and Tank, and No. 24 Sheet at 2.75¢, all 60 days, 2 per cent. off for cash. Skelp Iron remains as last quoted, 1.70¢ @ 1.72½¢ for Grooved and 1.87½¢ @ 1.92½¢ for Sheared, four months, 2 per cent. off for cash.

Old Rails.—There is a fair business, but prices remain as last quoted: Iron Rails, \$23.75 @ \$24; Steel at \$17 @ \$17.50 for short and \$18 @ \$18.50 for long pieces. Most of the Iron Rails sold here are purchased by valley consumers, but very few being used in Pittsburgh for some years past. A good many Old Steel Rails are brought here for remelting.

Structural Material.—Not so much new business, but mills making a specialty of this material are very busy working up old contracts. This has been an unusually favorable fall for building, as there have been very few days that outside work could

not be prosecuted, and contractors are now pushing to the best of their ability to get their work closed in, if possible, before the advent of winter weather. Prices remain unchanged: Beams and Channels, 3.10¢; Angles, 2¢; Tees, 2.60¢; Steel Sheared Bridge Plates, 2.15¢ @ 2.20¢; Universal Mill Plates, Iron, 2¢ @ 2.05¢; Refined Bars, 1.80¢ @ 1.85¢.

Merchant Steel.—A very fair business reported. No change in prices: Crucible Tool Steel, 6½¢ @ 7¢; do. Spring Steel, 4¢; do. Machinery, 4½¢ @ 5¢; Bessemer Machinery, 2.30¢ @ 2.40¢; Tire Steel, 2.20¢; Toe Calk, 2.40¢ @ 2.50¢; Steel Bars, 1.80¢ @ 1.85¢. There is a continued demand for Steel Bars, which appears to be growing.

Nails.—Trade remains rather quiet in Cut Nails. Price remains about as last quoted, \$1.60 for 30¢ average, 60 days, f.o.b. at factory in Wheeling or Mahoning Valley districts. Wire Nails are now very generally quoted at \$1.80, 60 days, f.o.b. at factory, and the market is firmer. There was a meeting of the Wire Nail manufacturers in this city last Friday, the object of which, it is said, was the forming of a trust similar to that of the Barb Wire manufacturers. For some reason or other the Carnegie firm was not represented at the meeting. Another conference will be held shortly.

Barb Wire.—Prices remain unchanged at \$2.45 for Painted and Galvanized and \$2.95 in car lots and upward, f.o.b. at factory in the Pittsburgh and Cleveland districts. It is said that an advance soon is contemplated, and that manufacturers are refusing to book any large orders in consequence.

Railway Track Supplies.—There is a continued demand reported. Mills making a specialty of Supplies have about all they can do, and prices are firm but unchanged. Railway Spikes, 2.10¢ @ 2.20¢, 30 days, f.o.b. at works; Splice Bars, 1.75¢ @ 1.85¢; Track Bolts, 2.70¢ with Square and 2.80¢ with Hexagon Nuts.

Wire Rods.—There have been no sales reported for a couple of weeks, in the absence of which we continue to quote at \$34.50 @ \$35, cash, f.o.b. at makers' mill. It is worthy of mention that while there are three Rod mills owned by Braddock Wire Company, Oliver & Roberts and Carnegie & Co., they are all consumers as well as producers, and it is only now and again that they have any Rods to sell and that a sale is made.

Billets and Slabs.—There has been less business the past week, but the mills both here and at Wheeling are pretty well sold up, and there is not as much pressure for business as there might be. We continue to quote at \$24.50 @ \$25, f.o.b. at mill, with most of the business at \$24.75. Of course, a good deal depends on the character of the order as well as the delivery in fixing the price.

Ferromanganese.—The last sale of domestic 80 per cent. reported was at \$65, cash, a reduction of \$1.50 per ton on the price that ruled for several months until within the past two or three weeks. It is rumored, but we cannot vouch for its correctness, that sales of 80 per cent. imported have been made at \$64.40 @ \$64.70, delivered in Pittsburgh.

Wrought-Iron Pipe.—There has been no improvement in the demand, nor is it to be expected at this season of the year. Business has been unsatisfactory for some time past, and the outlook for improvement is not very encouraging, as the demand always commences to fall off at this particular time. While the syndicate prices remain unchanged, they are not being very closely adhered to, and it is very difficult to maintain them when

business is dull, as is the case now and has been for some time past. The regular monthly meeting of the Manufacturers' Association takes place to-morrow, but it is not likely that any effort will be made to establish prices.

Steel Plates.—A continued good degree of activity is reported, but there has been no change in prices. Fire Box, 3.85¢ @ 4.25¢; Tank, 2.05¢ @ 2.10¢; Shell, 2.75¢; Flange, 2.40¢ @ 2.50¢.

Steel Rails.—There is a continued fair demand, but the price remains unchanged at \$30, f.o.b. at mill.

Old Material.—There is only a moderate business, and consumption is not as large as it would be were it not for the fact that some of the mills, having changed from natural gas to coal, are now unable to get a full supply of the latter, and Scrap dealers who are sold ahead report that mills are ordering them to hold back until they are in better condition in regard to fuel. Sales No. 1 Wrought Scrap at \$19.50, net ton; Cast Scrap at \$13.50, gross ton; Steel Bloom Ends, \$18, and Steel Rail Ends at \$18.50.

Connellsville Coke.—There is a fair business at unchanged prices; however, the demand is not sufficient to employ anything like all the ovens.

By Telegraph.—A. W. Thompson, secretary of the Etna Iron Works, Limited, at New Castle, Pa., has been appointed receiver for Jas. P. Witherow, engineer and contractor, of Pittsburgh, whose large works are located at New Castle. Mr. Witherow's financial trouble has been caused by inability to make collections to meet pressing engagements. It is probable that an extension will be granted.

New York.

Office of *The Iron Age*, 96-102 Reade street, New York, November 4, 1891.

American Pig.—The representatives of Southern furnace companies report that they are pretty well sold up and that considerable difficulty is being experienced through the scarcity of cars. This is the trouble annually experienced when cotton begins to move. We quote Northern brands, \$16.75 @ \$18 for No. 1; \$16 @ \$16.50 for No. 2, and \$14 @ \$14.50 for Gray Forge. Southern Iron sells at \$16.25 @ \$17 for No. 1; \$15.50 @ \$16 for No. 2; \$14.50 @ \$14.75 for No. 3 Foundry, and \$14.25 @ \$14.50 for Gray Forge.

Spiegeleisen and Ferromanganese.—The Spiegel market continues exceedingly dull, and is nominal. In Ferromanganese there is considerable irregularity, and only a moderate business is being done. We quote 10 to 12 % \$23 @ \$24; 20 % \$27 @ \$28, and 80 % Ferro, \$62 @ \$63.

Billets and Rods.—There have been some sales of domestic Rods, but no business is reported either in foreign Rods or in foreign Billets. We quote: Domestic Billets, \$27 @ \$27.50, delivered; foreign Billets, nominally, \$31 @ \$31.50, and domestic Rods, \$36.50 @ \$37.50, tidewater.

Steel Rails.—No sales of any consequence are reported in this market. It is not definitely known here who has secured the order for 5000 tons of 100-lb Rails for the Pennsylvania Company, for which bids were asked recently. It is hoped by those interested in the Steel trade that the Pennsylvania Railroad will soon call for its requirements for 1892. Usually the purchase by this company is the signal for buying by many other lines,

and it is believed that the company will not repeat this year its method pursued lately of holding off for a long time and buying in relatively small amounts. A very important share of its tonnage is that originating with the Rail mills on its line, and it would seem the duty as well as the interest of the company to give the mills all the benefits which helpful action can confer upon them. Prices remain unchanged at \$30 @ \$30.50, at mill. Since some misapprehension might arise from it, we may note that a lot of about 3000 tons of 67-lb Steel Rails, rolled years since at Troy for a New England road, are being offered at \$28.50, tidewater. We understand that these Rails are of the Ontario and Western section. The Rails have never been in the track.

Manufactured Iron and Steel.—The principal event of the week has been the placing of a contract with one of the large architectural works of this city for the Iron works of the Worthen building, which is to take 500 tons of foreign Beams, American sections. There are two large structures which are soon to come into the market, and which are expected to take about 5000 to 6000 tons of material. The Plate market continues demoralized. We continue to quote: Angles, 1.90¢ @ 2.10¢; Sheared Plates, 1.90¢ @ 2.25¢; Tees, 2.40¢ @ 2.75¢, and Beams and Channels, 3.1¢, on dock. Steel Plates are 1.95¢ @ 2.15¢ for Tank; 2.20¢ @ 2.30¢ for Shell; 2.45¢ @ 2.65¢ for Flange; 2.65¢ @ 2.75¢ for Marine, and 3¢ @ 3.25¢ for Fire Box, on dock. Bars are 1.7¢ @ 1.9¢, on dock. Scrap Axles are quotable at 2.15¢ @ 2.20¢, delivered. Steel Axles, 2.15¢ @ 2.25¢, and Links and Pins, 2.15¢ @ 2.20¢.

Track Material.—Conditions have not materially changed during the week, some of the leading mills still being eager for business in Fish Plates. We quote 2.15¢ @ 2.25¢ for Spikes, 1.70¢ @ 1.90¢ for Fish Plates, and 2.80¢ @ 3¢ for Bolts, delivered.

Merchant Steel.—We quote Hot-Rolled Shafting 2¢ @ 2.10¢; Machinery, 2.10¢ @ 2.25¢; Tire, 2.15¢ @ 2.25¢, and Toe Calk, 2.20¢ @ 2.30¢, delivered.

Old Material.—Melters of Steel Scrap report that Plate Shearings and similar material is being offered to them freely, while importers claim that there is some inquiry for Billet Ends which they are unable to fill at present prices. Old Rails remain nominally \$20 @ \$21.

Warrant Stocks.—The American Pig-Iron Storage Warrant Company report as follows:

	Tons.
Stock in yard, September 30, 1891.....	43,400
Put in yard for 31 days ending October 31, 1891.....	4,300
Total.....	47,700
Withdrawn 31 days ending October 31, 1891.....	1,700
Net stock in yard, October 31, 1891.....	46,000

Financial.

The pending elections have had a quieting effect on business, and all the markets are flat. The export movement of staple products is temporarily checked, but an indication of the aggregate movement is foreshadowed by the fact that, not to speak of shipments already made, 148 steamers are under charter at Atlantic ports, principally to load with corn and oats, but it is calculated that it all should take full cargoes of corn the total shipments would not equal 1 % of the crop. Wheat exports to date have been about 80,000,000 bushels. Primary receipts exceed all previous records. The North-

western stocks are less than a year ago, and the movement far in excess. Millers continue grinding on a larger scale than ever before known. The winter wheat movement is still light, and exports of new corn will not fairly commence before another month. Agents of the regular steam lines represent that there is hardly any room to be obtained this side of January to British ports. Therefore, the prospects are good for an active business by all transportation lines, whether ocean or rail, for the rest of the winter, and at stiff rates. Sailing vessels are inquired for. Two ships have already been chartered for British Channel. The French Senate has agreed to the removal of the prohibition upon the importation of American salt pork. It has also voted in favor of the imposition of a duty upon that article of food at 25 francs. Grain markets were stronger on the positive statement that Russia has prohibited further exports of all cereals.

Heretofore Russia has averaged 175,000,000 bushels per annum, as a source of European supply. The cotton situation, upon which so much depends, is peculiar. Despite very gloomy prospects at the beginning of the season, each succeeding week brought out a supply of astounding proportions, until finally the movement of last year was exceeded, and at present all calculations are baffled. Gold movements cause no special solicitude. The Bank of England raised its rate of discount to 4%, with the main object of restraining shipment to the Continent, as France will endeavor to draw money from England and Germany to help her investors who have taken the Russian loan. Dearer money in England, it is surmised, may affect the demand for American breadstuffs. A stirring event is the failure of the Maverick National Bank of Boston, a loss of something like \$500,000 having been occasioned by the recent tragic death of broker Evans. The deposits are about \$8,000,000. The Clearing House on Monday expelled the bank from the association, and will assist depositors who may need their aid. Imports of gold for the week have footed up \$1,950,000. It is not believed that the advance of the Bank of England rate to 4% can have a permanent effect in restricting exports of specie to this country. Between \$2,500,000 and \$3,000,000 in gold are now in transit.

Stocks were dull and irregular, with the so-called industrial stocks most prominent. The securities of the National Cordage and American Cotton Oil companies, particularly the latter, were more extensively dealt in than for a long time. The coal stocks were disturbed by the practical removal of the restrictions upon tonnage production by the mining companies and by apprehensions that the Reading is bent upon having a larger share in the monthly allotment regardless of consequences. On Saturday the only strong stock was Chicago Gas, which was said to have been advanced by a pool that has been at work for a number of days. Richmond Terminal was strong on the statement that prominent interests are to take hold of the management. On Monday the Pennsylvania Railroad declared a 3% dividend for six months, an increase of half of 1%, and the affairs of the Maverick National Bank had a depressing influence.

United States bonds were steady, as follows:

U. S. 4½s. 1891, extended.....	99½
U. S. 4s. 1907, registered.....	116¾
U. S. 4s. 1907, coupon.....	116¾
U. S. currency 6s.....	111

In bank stocks 50 shares of Oriental sold at 237½.

Forty-nine thousand ounces sold at 95½¢ @ 96¢. Bar Silver in London, 44½d. Money on call, 3¼%. Time money in good supply at 4% for 60 days, 4½% for

four months and 5% for six months on prime Stock Exchange collateral. Commercial paper in better demand. Prime indorsed bills receivable are quoted at 5½ @ 6½%, and first-class single-name paper at 6 @ 6½%.

Sterling exchange easier. Posted asking rates, \$4.81½ @ \$4.85. The bank return for the week shows a slight decrease in reserve, which now stands at \$12,338,525 surplus. The loans show a gain of \$2,371,800, attributed to a better mercantile demand; the specie is up \$1,334,800.

Imports.

Hardware, Machinery, &c.

Bing, Ferd., Hdw., cs., 9
 Bollger & Hintze, Mach'y, pgs., 11
 Borgfeedt, Geo., Hdw., case, 1
 Boker, Hermann & Co., Arms, cs., 20
 Botany Worsted Mills, Mach'y, cs., 37
 Dieckerhoff, Raffior & Co., Iron Buckles, case, 1
 Downing, R. F. & Co., Gas Stoves, cs., 30; Hdw., bxs., 13
 Field, Alfred & Co., Arms, cs., 27; Hdw., cs., 4
 Folsom, H. & D., Arms, cs., 6
 Falk, J. E., Machines, cs., 24
 Frase, P. A. & Co., Mds., cs., 9
 Fredheim & Co., Ironware, cs., 16
 Hartley & Graham, Arms, cs., 17
 Hammacher, Schlemmer & Co., Nails, cs., 40
 Knauth, Nachod & Co., Mach'y, cs., 11
 Kunhard & Co., Mach'y, cs., 19
 Lies, G. P. & Co., Mds., cs., 2
 Mackwathy, John, Mach'y, cs., 24
 McCoy, M. F. F. & Co., Chains, cks., 16
 Meacham Arms Co., Arms, cs., 46
 Martin, Robert, Mach'y, cs., 15
 Pennsylvania Railroad, Mach'y, cs., 2
 Sellers, W. B., Mds., cs., 2
 Schoverling, Daly & Gales, Arms, cs., 28
 Scott & Cameron, Mach'y, cs., 18
 Sheldon, G. W. & Co., Mach'y, cs., 3; Gas Stoves, crates, 5
 Vom Cleff & Co., Chains, cks., 13
 Ward, Jas. E. & Co., Mach'y, cs., 119; Nails, cs., 49
 Wiebusch & Hilger, Guns, cs., 12; Hdw., 16; Mds., cs., 8; Gun Parts, cs., 4
 Wyman, Chas. H. & Co., Guns, cs., 55
 Werlemann, H., Guns, cs., 70
 Order—Mach'y, pgs. and pcs., 9

Metal Market.

Copper.—The market remains in rather unsettled condition. At intervals during the past week there have been surface indications of a turn for the better, varied now and then by something of just the reverse nature, and at present the position is not easily defined. That consumers are inclined to purchase with greater freedom is not clear and the condition of the market for manufactured goods is not wholly assuring for any decided improvement in the immediate future. Shipments to Europe are still on a liberal scale, but new orders are unimportant and no great relief is likely to come from that quarter. There has been some inquiry suggestive of speculative interest, but the latter appears to be confined within the metal trade proper and apparently engineered for effect. Offers were said to have been made of 11½¢ on upward of 1,000,000 pounds of Lake Superior Ingot for delivery this year and 11¼¢ on smaller quantities. Spot stock at 11¼¢ found very few buyers, however, and there is more than enough to go around at that price, although the leading sellers have quoted out 12¢ as their "nominal" price. Casting brands sold in small parcels on the spot at 11½¢, but 11¢ is extreme value for large lots for future delivery.

Pig Tin.—In the speculative branch of the market interest has centered almost exclusively upon straightening out "privileges." Very few new obligations have been entered into. Under the weight of lower prices in London and somewhat burdensome supplies here, the "bull" interest have gracefully yielded, and, between cash settlement and taking up actual tenders, wiped out about 150 tons of October delivery contracts, at a profit to the opposition. The November "puts," it is estimated, involve about 350 tons. Some of these have been settled, but it is

uncertain what remains for the "bear" interest to cover. Purchases for trade account and consumption have been of extremely conservative character and moderate all told, the statistical position evidently prompting more than ordinary caution. Shipments from the Straits last month reached a total of 3500 tons, including 475 tons to the Continent, and the world's visible supply is shown to have increased about 300 tons during the month, amounting now to 12,107 tons. The increase is in stock afloat, the total of which November 1 was 7242 tons, against 5665 tons a month previous. At the close prices responded somewhat to better London cables. November delivery selling at 19.85¢ @ 19.90¢; net cash, while small parcels were valued at 20½¢ @ 20½¢, regular, out of store. The statistical positions posted, on the Metal Exchange, is as follows:

	Sept., 1891.	Oct., 1891.	Oct., 1890.
Shipments:	Tons.	Tons.	Tons.
Straits to Great Britain.....	950	2,230	1,300
Straits to America.....	600	825	750
Straits to Continent.....	175	475	450
Total Straits.....	1,725	3,500	2,500
Australia to Great Britain.....	500	459	525
Australia to America.....	100	50	100
Total Australia.....	600	500	625
Total shipments.....	2,325	4,000	3,125
Deliveries from London.....	1,570	2,090	1,390
Deliveries from Holland.....	570	890	730
Total deliveries.....	2,140	2,980	2,060
Of which shipped to America.....	110	480	430
Stocks of Tin.	Oct. 1, 1891.	Nov. 1, 1891.	Nov. 1, 1890.
	Tons.	Tons.	Tons.
Foreign Tin in London.....	2,974	2,555	2,387
Second hands in Holland.....	1,390	570	1,280
Spot stock in America, estimated.....	1,900	1,700	1,950
Total spot stock.....	6,134	4,865	5,617
Afloat for Great Britain.....	2,225	3,232	3,150
Afloat for Holland.....	1,440	2,080	1,580
Afloat for America.....	2,000	1,930	1,700
Total afloat.....	5,665	7,242	6,430
Total visible supply.....	11,799	12,407	12,047
Month's shipments to Continent.....	175	475	50

Pig Lead.—The movement of value has continued steadily downward and the outcome for the week is a depreciation of 10¢ @ 100 lb. At the decline consumers are as indifferent buyers as they have been at any previous time during the past month or six weeks, and neither jobbers nor outside operators manifest the least disposition to purchase with any liberality. In short, the indications are that smelters are suffering the penalty of attempting to make a one-sided market with the odds against them. Early in the week a few sales were made at 4.15¢, and subsequently a limited business was done at 4.10¢. The latter was top price at the close.

Spelter.—Not the slightest improvement has taken place in the demand from Brass manufacturers or from galvanizers, and even of single carload lots the sales have been comparatively light. The offering, on the other hand, has been more urgent, if anything, than it was last week, and the market is correspondingly depressed. Western brands have been sold at 4.87½¢ @ 4.90¢, but buyers at over 4.85¢ at extremely few at the moment.

Antimony.—Supplies are well under control in this and the foreign markets, and prices are very firmly held. Hallett's is quoted at 11½¢, LX at 12¢ and Cookson's at 15½¢, in wholesale quantities.

Tin Plate.—Ordinary Bessemer Coke-Finish Plates are quoted a shade lower, but Terns and Bright Charcoals are held with some showing of firmness at former figures. Demand for small parcels for

immediate delivery continues very fair, but no improvement is apparent in the call for future deliveries. We quote: Coke Tins—Penlan grade, IC, 14 x 20, \$5.25; J. B. grade, do., \$5.40; Bessemer do., \$5.32½; Siemens Steel, \$5.45. Stamping Plates—Bessemer Steel, Coke finish, IC basis, \$5.75; Siemens Steel, IC basis, \$5.85 @ \$6; IX basis, \$6.85 @ \$7. IC Charcoals—Melyn grade, \$6.50; for each additional X add \$1.50; Allaway grade, \$5.85; Grange grade, \$5.90 @ \$5.95; for each additional X add \$1. Charcoal Terns—Worcester, 14 x 20, \$5.75; do., 20 x 28, scarce; M. F., 14 x 20, \$7.50; do., 20 x 28, \$15.25; Dean, 14 x 20, scarce; do., 20 x 28, \$10.70; D. R. D. grade, 14 x 20, \$5.30; do., 20 x 28, \$10.12½; Mansel, 14 x 20, \$5.50; do., 20 x 28, \$10.50; Alyn, 14 x 20, \$5.50; do., 20 x 28, \$10.60; Dyffryn, 14 x 20, scarce; do., 20 x 28, \$11.20. Wasters—S. T. P. grade, 14 x 20, \$5; do., 20 x 28, \$9.85; Abercarne grade, 14 x 20, \$4.90; do., 20 x 28, \$9.70.

New York Metal Exchange.

The only sales reported took place on Friday, 30th ult., as follows:

25,000 lb Copper, October.....	11.80¢
25,000 lb Copper, October.....	11.75¢
25 tons Tin.....	19.75¢
(Seller's option, November-December.)	

British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, November 4, 1891.

The market for Pig-Iron warrants has been steadier and rather more active. Rumors that the syndicate holding a large amount of Scotch warrants was on the verge of breaking up had a somewhat depressing effect early in the week, but subsequent denials imparted confidence and strengthened the market, while a large turnover of Hematites promoted a better feeling in that line. Stocks in Connal's stores remain almost stationary, the latest returns showing 499,000 tons Scotch and 147,000 tons Cleveland. Latest sales of warrants were at 47/6 @ 47/7 for Scotch, 38/9 @ 39/ for Cleveland and 49/ for Hematite.

Pig Tin has ruled lower, partly under the influence of the decline in Copper, but chiefly under the weight of sales of cash lots, caused by the failure of a prominent operator and the announcement of heavy shipments from the Straits. Outside speculative interest has been light, and dealings were chiefly in liquidation of outstanding obligations. It is understood that the contracts of the suspended operator have been closed out, and the large quantity of tin turned over has passed into strong hands. This, along with good trade demand, has imparted a somewhat better feeling.

Copper prices advanced somewhat early in the week, but subsequently reacted, leaving the market in unsettled condition. The recent decline is not, in the opinion of well informed authorities, justified by the actual position, although spot stocks are shown to have increased 916 tons and the European visible supply 2175 tons during the past month. Chili charters during October estimated at 2000 tons. Transactions in furnace material include 320 tons

Anaconda Matte at 10/ per unit and 250 tons Montana Argentiferous on private terms.

The Tin Plate market has been quiet, and absence of improvement in orders from America tends to create a weaker feeling since the demand from other quarters is hardly up to the average at present. Some makers are yielding on prices, and have quoted as low as 12/7½ for ordinary Bessemer for early delivery.

Scotch Pig Iron.—No change in movement of makers' brands and prices almost stationary,

No. 1 Coltness, f.o.b. Glasgow.....	57/6
No. 1 Summerlee, " ".....	57/
No. 1 Gartsherrie, " ".....	57/
No. 1 Langloan, " ".....	57/6
No. 1 Carnbroe, " ".....	48/6
No. 1 Shotts, " at Leith.....	58/6
No. 1 Glengarnock, " Ardrossan.....	57/9
No. 1 Dalmeilington, " ".....	51/
No. 1 Eglinton, " ".....	51/
Steamer freights, Glasgow to New York, 2/;	
Liverpool to New York, 10/.	

Cleveland Pig.—Business has been moderate and the market is barely steady at 39/ for No. 3 Middlesborough, f.o.b.

Bessemer Pig.—Transactions are still on a moderate scale, but makers' prices remain steady at 50/ for West Coast brands, Nos. 1, 2 and 3, f.o.b. shipping port.

Spiegeleisen.—There is no improvement in the demand nor change in sellers' prices. English 20% quoted at 95/, f.o.b. shipping port.

Steel Rails.—New business has been moderate and the demand is only fair. Heavy sections quoted £4. 2/6 and light sections £5 @ £5. 10/, f.o.b. at N. W. England shipping point.

Steel Blooms.—Market remains very quiet. Makers quote £4. 2/6 for 7 x 7, f.o.b. at N. W. England shipping point.

Steel Billets.—Dealings are still of unimportant volume and at about former prices. Bessemer, 2½ x 2½ inches, quoted at £4. 5/, f.o.b. at N. W. England shipping point.

Steel Slabs.—Business moderate and sellers' prices are unchanged. Bessemer quoted at £4. 5/, f.o.b. at N. W. England shipping point.

Old Iron Rails.—There is little doing at present, but sellers are firm at old prices. Tees quoted at £3 @ £3. 2/6 and Double Heads £3. 2/6 @ £3. 5/, f.o.b.

Scrap Iron.—Demand is moderate but prices remain steady. Heavy Wrought Iron quoted at £2. 10/ @ £2. 12/6, f.o.b.

Crop Ends.—The market is quiet and unchanged. Bessemer quoted at £2. 12/6 @ £2. 15/, f.o.b.

Tin Plate.—The market slightly more animated, but buyers and sellers still apart on prices. We quote, f.o.b. Liverpool:

IC Charcoal, Alloway grade.....	15/3 @ 15/9
IC Bessemer Steel, Coke finish.....	13/6 @ ...
IC Siemens.....	13/9 @ ...
IC Coke, B. V. grade.....	13/ @ 13/3
Charcoal Terns, Dean grade.....	12/9 @ ...

Manufactured Iron.—Common Black Sheets bring rather better prices and other goods are very steady. General movement is fairly large. We quote, f.o.b. Liverpool:

Staff. Marked Bars.....	£ s. d.	£ s. d.
" Common ".....	6 15 0 @	6 17 6
Staff. Bl'k Sheet, singles.....	7 15 0 @	7 17 6
Welsh Bars (f.o.b. Wales)...	5 10 0 @	5 12 6

Pig Tin.—The market closes firmer, but quiet. Straits quoted at £90. 10/, spot, and £91. 5 for three months' futures.

Copper.—Prices are still unsettled and buyers cautious. Merchant Bars quoted at £46, spot, and £46. 15/, three months' futures. Best selected, £51.

Lead.—Demand is slow and prices tend in buyers' favor. We quote at £11. 15/ for Soft Spanish.

Spelter.—Business moderate, but the market steady at £23. 7/6 for ordinary Silesian.

The Gray Electrical Company, of which Prof. Elisha Gray is president, have prepared plans for a factory to be erected at Idlewild, on the Chicago and Northwestern Railroad, north of Chicago. The building is to be 60 x 140 feet and three stories high. The work of construction will commence at once and it is expected that the factory will be in operation by April 1. The cost of the building will be \$30,000. One hundred men will be employed, chiefly those skilled in the manufacture of electrical apparatus. It is the intention of the company to manufacture all varieties of electrical material permissible under the patent laws, but the chief object will be to manufacture the telautograph instrument, which is an invention of Professor Gray, and the introduction of which into the general telegraphic system, it is claimed, will simplify and facilitate commercial transactions by telegraph.

The Crescent Horseshoe and Iron Company are building a rolling mill and horseshoe works at Max Meadows, Va. There will be two trains of rolls of 15 inches and 9 inches, respectively, and a number of horseshoe machines of the company's own special design. The Edge Moor Bridge Company are supplying the iron for the building and the A. K. Rarig Company of Buena Vista, Va., the machinery. Operations will be commenced in about four months.

Henry K. Swinscoe, Clinton, Mass., has secured a patent on an improvement in the galvanizing process. The improvement as described in the specification is in the method of galvanizing or treating wire cloth or netting, which consists in immersing the article to be galvanized in a bath of molten metal and then drawing from the bath and through a wiper composed of coal dust floating on the surface of the molten metal, the claim being made that coal dust is far more efficient than coke.

No. 3 furnace of the Maryland Steel Company, Sparrows Point, Md., has been put in blast.

For some time past negotiations have been on foot looking to the establishment of a tin-plate plant at Blairsville, Pa., located at the intersection of the West Penn Railroad and Allegheny Valley Railroad. A meeting of those interested was held in Blairsville recently, and a committee appointed to procure a charter. A board of directors was also appointed, consisting of the following persons: T. D. Cunningham, Jas. A. Graff, D. M. Fare, Paul Graff, J. M. Devers, J. M. Harvey and R. W. Werhle. It is said the new company propose to invest about \$75,000 in the plant, and will give employment to a large number of hands. Several constructing firms in Pittsburgh are understood to be bidding on the machinery.

HARDWARE.

Condition of Trade.

WHILE OCTOBER business was to a certain extent disappointing, inasmuch as it was not characterized by the volume that was anticipated by many, a review of the month shows that its business was of fair amount, the aggregate of sales being larger than was supposed. November opens with excellent expectations, but the trade are more reluctant to express themselves with confidence, inasmuch as the season thus far has failed to realize the more sanguine anticipations. The indications at present are regarded as pointing to a good trade during the present month, stimulated as it must be by the advent of cold weather, and favored also by the fact that farmers will have more leisure to attend to purchases, which in many sections have been deferred longer than usual. Reports from retailers in different parts of the country indicate an active business, some of them expressing themselves as so busy that they have little time for attending to replenishing of stock. Collections also are in a better condition; a fact which promises well for future business, as careful houses order with extreme caution when they have difficulty in meeting promptly their maturing obligations. In the matter of prices there has been no important change in the general tone of the market since our last review. As a rule prevailing quotations on many lines of goods are regarded as very low, but as yet there are no indications of an advance. The present condition of the market is one which unquestionably calls for careful and constant scrutiny on the part of buyers, as there is a possibility that on lines which are exceedingly low there may be at any time a recovery, and a movement more or less evident toward better prices.

Chicago.

(By Telegraph.)

A gratifying improvement is noticeable in Shelf Hardware. The volume of business is now coming up to the proportions of a genuine fall trade. October was a much better month than September, but November promises to roll up a greater record. Cooler weather in the Northwest is having its effect on the demand for seasonable goods. Transportation by freight is too slow in some cases, and quite bulky goods have been sent by express to meet the urgent demand of those who failed to make preparation for the busy time now on them. The demand has not as yet struck staple goods, such as Nails, Barb Wire,

&c., which are dragging on the hands of jobbers, but is mainly confined to Shelf goods, such as Builders' Hardware, Tools, Screws, Hinges and Nuts, and to seasonable goods and House-Furnishing goods. Heavy Hardware is quite active; the demand covers Wagons, Buggies and supplies of all kinds. Yet the volume of business in this line, large as it is, falls short of jobbers' expectations, as they have made preparations for handling an increased trade at this season. Collections are easier, but there is some still some complaint in certain branches.

St. Louis.

(By Telegraph.)

Hardware.—The demand for Hardware is not as heavy as one week since, but the volume of business is very satisfactory in comparison with last year. Prices do not change any, except an occasional cut on a special line or broken stock to close them out and make room for fresh goods. Collections are only fair and in some instance are reported very poor. Barb Wire, Wire and Cut Nails and Builders' Hardware are not much called for at this time. Tin Plate is ordered freely and house-furnishing goods are being sold in large quantities. The outlook is fairly encouraging, and once the weather gets settled a steady trade is looked for.

Louisville.

W. B. BELKNAP & Co.—Business for October has been large in volume, at the same time without press for goods. There has been notably lacking any vitality and snap. Prompt deliveries are hard to command on many lines of goods, but even that fact seemed to carry no encouragement as is usual, nor to give backbone. Prices are certainly low enough to render investment safe. This, however, is in itself enough to make trade good. There has been more or less trouble among the banks in the Southern country, whose funds have been loaned out on land speculations. All such enterprises are flat, as though they had been ironed out. It is impossible to get a new loan in bank on what two years ago was considered good security. This is, as a matter of course, an untoward influence and may take a year or two to work out of. On the other hand, the cotton crop in the South is coming out handsomely; owing to the long continued dry, bright weather the quality will be the finest in some sections ever known. This same continued drought which works good to some is causing many disastrous conflagrations in town and country, and is forcing all freights on to the railroads, which, we understand, are showing up with satisfactory earnings. Even with this additional stimulus the business is not yet as extensive as they counted on. The fact that farmers are holding back their grain, while it depresses temporarily, demonstrates the fact that the gentlemen of the Alliance are not as badly off as

they or their political friends would have us believe. Collections are rather better and there are many who hold to the idea that '92 will be ushered in most auspiciously. By that time the crops will have been realized on to a large extent, and money presumably much more easy than at present.

Philadelphia.

SUPPLER HARDWARE COMPANY.—Trade during the past three weeks has been on the par with what we have experienced for about the last 30 days, being steady, without any particular rush. Purchases are made in a conservative way by the retail trade, prices remaining without much change. Evidence of extending and enlarging the export trade of this country is developing itself in some port throughout the country each month. At the present time two steamship lines are being established in our city; one of the two is proposed to run to Mexico and the other to Brazil, there being sufficient encouragement for the belief that both these lines will be self-sustaining. Every channel that can be opened for foreign shipments adds materially to our national prosperity. As a nation we are capable of enormous and wonderful expansion in both trade and agriculture, and the constant anxiety is where to place our overproduction and surplus. Our current circulation is now at maximum point—indeed, in excess of that of any previous time since we have been on the gold basis—and our coast cities have been able to supply the Southern and Western demands for funds for moving their crops without affecting in the least their ability to supply their home demand. Comparatively few persons realize why so great a drain was made upon us for gold during the early spring and summer months. Comparative figures show that we, as a nation, imported less goods in 1891 than in 1890. They also show that the amount reported was larger in 1891 than in 1890, but the amount of sterling exchange sold to traveling tourists, does not show in the exhibit. The vast crowds that flocked from our shores this year, beginning before the cold breath of spring had left, and continuing with unabated activity until late in the summer, was unprecedented. Gold shipments were required to meet letters of credit, the proceeds of which were permanently scattered over Great Britain and the Continent. Nor was this all. Europe needed additional gold beyond that which was so lavishly scattered, therefore any balances that were deposited in this country were called for, besides which our own securities were sold to meet the demand. The cry that was heralded throughout the country "This gold must be returned; it will soon come back," was all very well, but in what way could it be returned, or what reason for coming back, had it not

been our ability in supplying Europe with what they needed in the shape of wheat, corn, rye and other commodities? To this date we have had about \$25,000,000 of our \$75,000,000 returned to us, which has been a godsend to our country, as well as a godsend to European countries, that have badly needed all our surplus.

Collections for the last 30 days have not been quite up to the average, several sections being rather slow. Our local experience in failures this year agrees with the various reports sent out at various times of R. G. Dun & Co. and Bradstreet & Co., and show an excess in 1891 over 1890 and 1889, both as regards the number of failures and the liabilities. Critical investigation into their affairs develops the fact that a great number of these have not been owing to continued depressed trade, but have occurred in some instances from an excess of borrowed money in starting business; in other instances money withdrawn from the business for outside purposes; in other instances extravagance beyond the profits, and in some instances, we regret to state, show a lack of business honesty and integrity. The weather at present is more seasonable for trade, but locally it is thought that trade has been affected somewhat unfavorably on account of our November election. Certain it is that our trade has been affected by the constant agitation and by a repetition in various forms and disguises for the thousandth time, of the defalcations which occurred during the last summer, as between the City Treasurer of Philadelphia and two well-known banks. This agitation has been overdone rather for political purposes than owing to any superabundance of honesty on the part of either political party.

Cleveland.

THE W. BINGHAM COMPANY.—To sum up for October, trade although not what was expected has been of very fair volume, and of a satisfactory kind. Orders, while not large, have been quite numerous and for good assortments. Merchants are not speculating, they are buying just what they need and only for immediate wants. Stocks throughout the country are in excellent shape, so when the turn comes, if it ever does come, we should have an immense business. Ohio is decidedly stirred up politically this fall, and that (as it always does) has had its effect upon trade. Prices do not seem to gain strength, and are without indications of any immediate improvement. Collections are fairly satisfactory.

Boston.

BIGELOW & DOWSE.—During the past two weeks there has been a marked improvement in the volume of business as well as in remittances. Easier money establishes confidence, and buyers have more inclination to stock up, now that there is good assurance that they will be able to pay for the goods they buy. Many retailers report exceedingly large sales. The larger builders have good contracts, and the weather is favorable for outdoor work. While October sales will fall short of last

year's, there is a good prospect that November will make a much better showing. The advance in Manila and Sisal Rope and in common Carriage Bolts is being well maintained, but notwithstanding the extremely low-priced ruling on General Hardware there is considerable cutting. Skates were never so cheap as they are to-day, and notwithstanding all the factories are full of orders the prices are completely demoralized. Wire Nails were never so low in price, and although manufacturers claim to be selling at a loss, many of them will give their extreme price for insignificantly small lots. Easier money may remedy these evils. We hope it will.

Omaha.

LEE-CLARKE-ANDRESEN HARDWARE COMPANY.—We have to report trade in a very flourishing condition. Jobbers of Hardware, as well as other lines, are enjoying a remarkably fine run of trade; in fact, they are rushed with about all the business they can attend to from day to day, and the good fall trade which has been anticipated has evidently become a reality. Prices still remain unchanged, as they are about as low as could well be, and do not show any disposition to climb higher. The prospects for the future were never better in the grain-growing sections of the West, and the outlook is all that could be desired. Farmers are feeling the results of the big crops and satisfactory prices for cereals, and are certain to continue to buy more goods than usual. City trade naturally follows that of the country, and local retailers are looking forward to a heavy Christmas trade, though the movement of goods just now is comparatively light. In trade circles it is noted that money is gradually working easier as collections improve. It cannot be said that money is scarce, as it is really in fair supply, but there is a rigid scrutiny of all securities offered, and this in substance has been the situation for some time back.

New Orleans.

A. BALDWIN & Co.—Since our last report the situation remains unchanged and there is no special feature to mention. Nails and Barb Wire do not seem to move in any quantities and every one seems to be piecing up their stock according to their wants. Crops are being marketed much more rapidly than the past season, but the demand for Hardware does not seem to increase in proportion.

Baltimore.

CARLIN & FULTON.—While the present month, as compared with that of September, always shows diminished sales, we regret that this year the decrease is much more perceptible. This we account for by the dullness of trade throughout the Cotton States, the result of the great depreciation in price of their one staple, and also by the fact that while large crops of wheat and corn with satisfactory prices for both should stimulate business in other sections, the reaction from the exaggerated values of real estate has had as depressing an effect upon business generally as has been caused by the low price of cotton.

The situation, however, is full of promise, for while trade is comparatively sluggish the liquidation of indebtedness has been steadily going on, and it cannot be but a very little while before the consumption of stocks throughout the country, and the necessity for replacing them, will start the wheels of business into their fullest activity.

Notes on Prices.

Cut Nails.—The condition of the Cut Nail market remains without special change, continuing in the unsatisfactory state that has characterized it for some time. Lack of strength with a slight tendency toward lower quotations, referred to in our last issue, still continues. The demand is irregular, and though covering in the aggregate a considerable quantity of Nails, is not large. There is some difference in the disposition of leading manufacturers in regard to business obtainable under these conditions, some of them being inclined to offer slight inducements in the way of further concessions, while a few are to a certain extent withdrawing from the market and limiting their production or shutting down their mills. The price in the East is \$1.50 for round lots at mill, with concessions on desirable orders. In the Wheeling District the quotation is \$1.50 to \$1.55 with 30-cent average.

Chicago, by Telegraph.—Manufacturers of Cut Steel Nails are doing a steadily increasing business, but prices are not improving to correspond. Local makers quote \$1.65 on 30-cent average, but Wheeling manufacturers are taking renewed interest in this market and are offering inducements which are somewhat better. They reduce the base price, but require a part of the order to consist of 3d. fines. The effect of this must be a lower range of prices wherever the competition is felt. Jobbers' prices are maintained at \$1.75 to \$1.80, from stock.

Wire Nails.—The volume of business has been fair, including as it does some liberal orders from large buyers and many small orders from the trade in general, the latter being filled at prices which approximate those obtained by the large buyers. Quotations are on a basis of \$1.75 to \$1.85, at mill, the former figure being given only on the best and largest orders. From store small lots are quoted at \$2 to \$2.15.

Chicago, by Telegraph.—Manufacturers' agents have enjoyed an excellent trade the past week, principally from Northern points to be reached by lake before the close of navigation, yet they have been able to do some business in this immediate locality also, which is rather unexpected in view of the fact that so many Nails have recently been unloaded here. They quote \$1.90, Chicago delivery, from factory. Jobbers ask \$2 from stock, but are now making direct shipments from factory in small lots at special prices to their trade.

Barb Wire.—There is some complaint of sluggishness in the demand. The market, however, as a whole, remains without special feature, the prices of the Columbia

Patent Company being regularly maintained.

Chicago, by Telegraph.—An increasing business is experienced by manufacturers, but jobbers report their trade very backward for the season. The schedule of prices established by the Columbia Patent Company continues unchanged.

Copper Goods.—Sheet Brass, Copper, &c., in sympathy with the condition of the Copper market, are weak, and concessions in price are being made. The effect of this is also slightly felt in Copper Rivets and Burs and other goods in which this metal is an important part.

Shot.—While no change in the price of Shot has been as yet announced the market is regarded as weak, owing to the condition of the raw material, and it is thought not unlikely that a decline may result.

Lead Pipe, &c.—The following reduced prices on Lead Pipe, Sheet Lead, &c., are announced under date, November 2:

	Per pound.
Lead Pipe.....	\$0.06½
Block Tin Pipe.....	.37½
Sheet Lead.....	.07½
Tin-Lined Pipe.....	.15
Old Lead in exchange.....	.03½

Magic Oscillating Curry Comb.—This article, manufactured by the Chieftain Company, Canton, Ohio, and illustrated in our last issue, is sold to the trade at \$2 per dozen.

Glass.—There appears to be no new features in the Window Glass market, except that the factories report a slow improvement in demand. As cold weather approaches the usual amount of Glass will be required for repairs, which though comparatively small in each town, amounts to a large quantity in the aggregate. While the demand for Glass is comparatively light, stocks are not accumulating in manufacturers' hands, and additional factories are starting up each week. The price of Imported Glass remains unchanged, and importers report a satisfactory trade in this line. Glass is quoted as follows: American Window Glass, in carloads, 80 and 10 and 5 per cent. discount; less than car lots, 80 and 5 per cent. discount; French Window Glass, 75 and 10 per cent. discount; American Plate is held at a discount of 50, 10 and 5 per cent., and Imported Plate at a discount of 60 per cent.

Morgan Odorless Broiler.—The Sun Stamping Company of Kalamazoo, Mich., announce that the Morgan Odorless Broiler and Toaster will be sold at a list price of \$12 per dozen, with 33½ per cent. discount. This utensil is illustrated and described in our department of Hardware novelties and is also advertised in this issue.

Mechanics' Aprons.—The Mechanics' Handy Apron, manufactured by Cleveland Novelty Company, Cleveland, Ohio, and described in a recent issue, is sold at \$7.20 per dozen, subject to a discount of 33½ per cent.

Trade Items.

IN A CIRCULAR issued to the trade Frederick Malleon, formerly located in Brooklyn, N. Y., states that he has incorporated, at Trenton, Oneida County, N. Y., the Frederick Malleon Tackle Company. Here with increased facilities and reduced manufacturing expenses he states that he is in a position to deliver goods promptly, which he was unable to do formerly on account of restricted space. The new company solicit calls from the trade, and their orders for such specialties in Fishing Tackle as patented Serrated Ferrule Rods, Split Bamboos, Greenheart, Lancewood, Bamboo and other Rods, Fine Reels, Hooks and Leaders, &c.

A CIRCULAR announces the purchase of the interest of W. D. Bewley of the late firm of Bewley & Sullivan, Elberton, Ga., and the formation of the Sullivan Hardware Company, with C. S. Sullivan in immediate charge.

COREY, DOWNS & CO., having purchased the interest of C. S. Moore in the firm of Corey, Moore & Co., will continue the business at the old stand. The new firm comprises David Corey, J. Willis Downs and Charles W. Downs.

In *The Iron Age*, October 22, we mentioned a report that J. A. McDermott & Co., Clyde, Ohio, had disposed of their Hardware business. This is, however, an error, and the firm advise us that they are conducting business as formerly.

THE AMERICAN CUTLERY COMPANY, 191 Mather street, Chicago, now use oil for fuel exclusively throughout their factory. They have 23 forges and two steam boilers running with this fuel, which they state is not only cheaper than coal but also gives them much better results. They estimate that they have gained at least two hours per day, as compared with the time formerly wasted in waiting for furnaces or forges to heat up. If they had no other evidence of the saving of time by their workmen, they say it is sufficiently shown in the increased output of their factory. Their oil costs 65 cents per barrel, delivered at their works. They are further saved the annoyance and expense of carting ashes, which is no small matter to a concern located in the heart of a large city.

THE HOPKINS AND DICKINSON MFG. COMPANY of Brooklyn, N. Y., have established an office in room 1311, Chamber of Commerce, Chicago, under the management of F. G. Draper. They carry in their western quarters a full line of samples of builders' hardware and other specialties.

THE MUNGER-COLTON MFG. COMPANY, Chicago, Ill., provide an explanatory sheet of the Colton Parlor Door Hanger. The sheet is about 2 x 3 feet in size, and illustrations are given in detail, showing the manner of applying the hanger, and how it appears from various points of view. In packing the hangers the screws for the different parts are put up in separate envelopes, which are so marked; as for instance, screws for plates on top of doors, for bridge pieces, for striking plates, &c., thus avoiding confusion and delay in putting on the hanger. The care and enterprise manifested by the company in this matter will be appreciated by the trade and those who apply the hangers, and should aid in marketing the goods.

OUR READERS will be interested in the advertisement of Campbell Cutlery Company, Syracuse, N. Y., illustrating their Cutlery Show Cases and calling attention to the evident advantages of their methods or accommodating and displaying such goods.

THE ENTERPRISING firm of Randolph & Clowes, Waterbury, Conn., and 131 Worth street, New York, have a hanging card with wood ends, something over 2 x 3½ feet in size, which gives a view of their plant and also illustrations of their large line of fancy and extra fancy patterns of Brazed Tubing and of Brass and Bronze Moldings. These goods are shown in great variety, there being 60 patterns of the former and 52 of the latter. A price-list accompanies the card. The cuts are large enough to give an excellent idea of the styles of these goods at a distance. Their product also includes Seamless Brass and Copper Tubing, Braziers', Cornice and Polished Copper; Sheet, Strip and Sign Brass; Copper Bottoms, Brass Kettles, &c.

IN THE SPECIAL NOTICE which appears on page 70 it will be observed that Haydock & Bissell, 12 Murray street and 15 Park place, New York, announce a trade sale of Table and Pocket Cutlery, Carvers, Butcher Knives, Scissors, Shears, Skates, &c., on Wednesday and Thursday, November 11 and 12. This sale is referred to as the last Cutlery sale of the season and will doubtless secure the attention of the regular Cutlery buyers, as well as the holiday and Thanksgiving trade. The goods will be sold without reserve.

AN INGENIOUS ADVERTISING MEDIUM is in the form of Cross-Cut Saw shaped pieces of paper, 6 inches long, fastened together at one end by an eyelet. This comes from Foster, Stevens & Co., Grand Rapids, Mich., and is prepared by Simonds Mfg. Company, Fitchburg, Mass., and other points. Their plan of grinding Saws and the distribution of gauge is explained, together with some other advantages claimed by them. The idea is neat and effective, as well as novel in design.

THE TRADE WILL OBSERVE among the special notices on page 70 one signed "Side Line," in which the advertiser announces his desire to make arrangements with some parties canvassing the retail trade with a limited line of goods, by which they will represent to retailers the specialty he is putting on the market. This article is referred to as one of substantial merit. It is not unlikely that some manufacturers or manufacturers' agents will find this opportunity deserving their attention.

Commercial Travelers.

AT THE LATE MEETING of the National Wholesale Druggists' Association at Louisville, Ky., a report which we print below was presented. Although it relates to commercial travelers in a special line of business it is of equal interest to Hardwaremen, and will be read with pleasure not only from its recognition of the position occupied by traveling salesmen and the ability and skill which characterize their work, but from the genial and pleasant way in which the matter is discussed. The practical suggestion with reference to the remuneration for travelers is also deserving of careful attention.

Your committee has had such able predecessors that an elaborate report for the year 1891 is as unnecessary as it is impossible without repetition. A few figures, however, are harmless and interesting.

There are about 1250 travelers directly connected with the wholesale drug houses of the United States. This does not include proprietary, pharmaceutical or druggists' sundry houses, manufacturers of articles used by the drug trade, or any other class of dealers, whose interests in whole or in part are analogous to that of the wholesale druggists.

To support these 1250 commercial travelers the wholesale druggists pay out annually about \$3,000,000, an amount which must approximate the net annual profit made by the wholesale druggists of the country.

If every commercial traveler in the wholesale drug line was discharged would it double your profits? What does the commercial traveler do for you? Does he create a demand for drugs? If he protects you from competition from your neighbor, does he do it by his friendship with your customer, or are the times so prosaic that it is reduced price and not good will that he uses to protect you? Does a reduced price, plus his traveling expenses redound to your advantage? Suppose this competition from your neighbor was removed? Would you need traveling men? Why does Germany maintain a standing army? Is it to maintain peace at home, or because France does? Is it necessary? Yes, because France does. Is it an advantage? Yes, because France does. Who gets this \$3,000,000 which you pay out annually? Hotels, railroads and the commercial traveler. Why don't you drop this expense for one year, build a \$1,000,000 hotel, put your travelers in it, spend \$500,000 in feeding them, put \$500,000 in the bank as an endowment fund for indigent hotel keepers and take the last \$1,000,000 and blow it in at the next annual meeting of the National Wholesale Druggists' Association. What a glorious time we would have. Think of it; we could pay for a cab from the depot, and every mother's son of us could take in the Mammoth Cave Excursion, instead of having to lie about our being so busy we haven't the time.

Seriously, such an absurd proposition as the above shows the fallacy of the line of thought which precedes it. The commercial traveler is not a standing army, but the most active set of business warriors which the world knows. He is the advanced guard, skirmisher, minute man, scout and soldier in one. There never was any great body of upright men engaged in an honorable avocation but what they had an adequate reason for existence. The commercial travelers of this great and wonderful country are working as part of God's machinery of civilization. There is an unwritten law of progress which melts like wax the thoughts and opinions of men and casts them in the mold of God's will. They must conform with His great plans or they will be thrown like drift wood to bleach on the rocky shore of retrogression. The commercial traveler is one of the chief factors of modern business advancement. Without him our railroads would scarcely live, much less extend their lines. The modern Pullman would be like Darwin's missing link. We would crawl from New York to Chicago in unlimited time. The dining car would be at the ten-minute station, and we would still be gnawing at those hand-sewed doughnuts which the traveling man—God bless him—has at last consumed. The darky porter is the only man on the railroad who kicks at the commercial traveler. He has his hand caloused and probably covered with corns by the innumerable quarters which at first tickled it, and which, by the way, we, the Wholesale Druggists' Association, have checked in the expense book as sundries, while the salt tears trickled through our eyelids. Hotels, those marvelous palaces which extend to us their hospitality, make us at home wherever we may wander, and which contribute to the lasting benefit of every community where they exist, are an outgrowth directly traceable to the commercial traveler. He stands between the wholesaler and retailer as the wire of the telegraph between the two electrical instruments, and communication would be impossible without him. His brisk air and cheerful face encourage and brighten the very atmosphere of business; his ideas and suggestions awake from his lethargy the slumbering re-

tailer and open new avenues of trade. The commercial traveler is the whisk broom of business, and his duty is to brush the cobwebs from the corners and enliven the conservatism of both his customers and his employers.

How many of you would be as bright and successful business men as you are to-day if you had never been commercial travelers? What city could stand in the front rank of business activity and civilization if it forbid the entrance of commercial travelers? The commercial traveler founded his right to exist on a rock which cannot be removed without shaking to its foundation the whole structure of business. Let us then bow to the inevitable and patiently check up his expense book.

There are, however, many errors which we make in our dealings with the commercial traveler which prevent our deriving the maximum benefit from his efforts in our behalf. One is the method of his compensation. If we pay a salary, we are tempted to pay less than will secure the best ability. We must not forget that the traveler represents us, and, therefore, should be a fitting representative. If we pay a commission, we tempt the traveling man to sell goods at any sacrifice of his employer, and demoralization of prices is inevitable. There seems to be a middle course open, which your committee offers as a suggestion, merely having concluded at their various meetings to follow the esteemed example of this association in regard to resolutions. Suppose the basis of a traveling man's compensation be made a salary and expenses; that his employer give him a schedule showing the net cost of goods, plus a percentage for handling them; that at the end of the year the amount of profit on the traveler's sales be figured out and from it deducted salary, expenses, bad debts and other losses, and from the net profit remaining a percentage be given to the salesman, you will perceive that this is just to all concerned. The salesman would strive for high prices, would reduce his expenses, be careful of bad debts, and be as much interested as his employer to roll up a handsome profit. This suggestion is the consensus of opinion which your committee obtained from a correspondence aggregating over 1000 letters, and is reported without comment.

Importations of Guns and Cutlery.

WITH REFERENCE to the statistics given in our last issue of the importations of Guns and Cutlery in 1891 as compared with 1890, we have received the following communication from A. H. Saxton of Alfred Field & Co., 93 Chambers street, New York, in which attention is called to the fact that the falling off during the present year is in large measure owing to the exceptional importations last year in view of the increase in the tariff:

"Your comparative report of the importations of Guns and Cutlery for the first six months of the years 1890 and 1891 is misleading, and as you call special attention to the decrease of imports of these articles in 1891, a proper explanation should go with the statistics. As every one in the trade knows, the year 1890 was exceptional in the volume of imports, owing to the anticipated advance in the Tariff, and in some cases enough goods were imported to supply the market for years. It is only necessary to go back a little to demonstrate this, as it will be found from the Government statistics that the total importations of cutlery for the nine years preceding

1890 does not average over what was imported in the first six months of 1891. Also in guns, the total importations for the whole year 1889 amounted to \$1,159,157, whereas the importations for the first six months of 1890 amount to \$1,013,318. The comparison is so manifestly unjust, without explanation, that I trust you will publish this statement."

Hardware Burglaries.

WITH REFERENCE to the measures which can be adopted by Hardwaremen to secure their stores or their more valuable goods from burglars we have the following advices from an enterprising Hardware house in New Jersey. Our correspondents explain the methods by which, at a small expense, they have added very largely to the security of their establishment:

Noticing article in this week's *Iron Age*, under head of "Hardware Burglaries," we feel we have as good an arrangement as is possible to prevent same, and, considering its small cost, we herewith submit it. In these days of competition every live Hardwareman has, or should have, in connection with his regular Hardware line a small stock of Electrical Goods, and should, therefore, be able to put up for himself the same arrangement as we have. This consists of a complete automatic electric burglar alarm. Every door and window in our store is connected. The alarm is placed in a spot not reached by the burglar, and being a 6-inch bell is easily heard. Thus, should a door or window be opened, we could hear the alarm, the noise occasioned by which would justify some one else in making himself scarce. We have an automatic drop or constant ringing attachment, and, should the alarm start, it cannot be stopped by quickly closing the window or door, but continues ringing until drop is lifted. We also made an automatic switch for connecting the alarm, and when the store is locked for the night the bolt in the lock connects the alarm, thus making the whole plant automatic. When we lock up we know our store is safe from the burglar, unless he gets in some other way than by means of the doors and windows, which is hardly probable. We may add that the total cost of our burglar alarm was between \$7 and \$8, and consists of one 6 inch bell, one automatic drop, one automatic switch, two window connections, four door connections, four cells battery, and about 300 feet insulated wire. This cost does not include the application of the alarm, which work we performed ourselves.

A Hardware firm in New York State describe a system of burglar alarm that they adopted some ten years since. They have connected with their outside doors and lower windows, wire and springs to form the electrical connection with the battery and bell. The bell is located in a sleeping room occupied by one of the firm, and the opening of any door or window causes the bell to ring an alarm. In the day time the battery is switched off. About two years ago this store was entered by burglars, who were frightened away by the alarm before they could be caught, and before they had time to carry anything away. Our correspondent feels satisfied that had it not been for this system of protection they would have lost more than ten times the cost of the apparatus. Their confidence in this safeguard is so great that the safe is frequently left unlocked, and the store doors have been left unfastened a number of times.

Remittance Blanks.

WE GIVE HERewith several forms of remittance blanks used by Hardware houses in different parts of the country. It will be observed that they differ considerably in their arrangement. Those using them refer to the advantages and merits of each. They may be suggestive to some of our readers, who from them will be able to adopt a form which will meet their views and business methods, or at least to receive from them suggestions as to how a remittance blank may advantageously be arranged so as to combine the good points which may be recognized in several. The forms are given reduced in size, but the arrangement is preserved so as to give a fair idea of the blanks and the manner in which they are intended to be used.

Modern Locks.

BY W. W. B.

THE ADVANCE in lock manufacture has been by stages, it may be said, each lock having a certain advantage over the preceding one, and the production of each stage varying in a considerable degree from the other. Size, form and mechanism have each in turn been subjected to alterations until the lock of to-day is very unlike that of a few years ago. The

OLDEST LOCK

of which we have any detailed information was used on a gate leading to a tomb in an unknown Egyptian city. This lock was made of wood and was about 12 x 8 inches and 2 inches thick; the key was a straight stick, having the bit mortised in it, and the sides of the bit were cut to fit what is now known as the lock guards. Inside the case two wooden pins were arranged to drop in holes in the bolt at the point of rest, and also when the bolt was thrown; these pins were lifted by the key and fell in place when the key was withdrawn, acting as the modern tumblers do. The security of this device rested practically in the key biting and lock guards. For want of an older lock on which to build up the modern manufacture, we will take this one, which is estimated to be over 4000 years old.

Until within a few years the lock in general use was the same as this one, the

IMPROVEMENTS

being simply the substitution of metal parts in place of wood and the greater intricacy of the biting, the general principles being the same. In size the old wooden lock and that of its successor remained for years alike. One can to this day see on some of our older buildings rim locks of the above size, with keys from 6 to 8 inches in length and weighing in the neighborhood of $\frac{1}{2}$ pound.

At the Museum of Art in New York may be found locks and keys of ancient date even larger than the ones mentioned, and in fact there are in existence to day keys that are nearly a foot long, and weighing over a pound. It seemed to be the rule in olden times to build the lock

in accordance with the size of the building, and it is a problem how the ancient caretaker managed to transport these ponderous pieces of mechanism from place to place. Following the

OLD STYLE GUARDED BIT KEY LOCK came the lever or tumbler lock, in which the bit key is also used, but the security is transferred from the guards to a series of tumblers, that retain the bolt in place both when at rest or thrown. Following the lever or tumbler lock comes the escutcheon lock, in which the security is

bitings; these bitings allow the key to enter and operate in the lock; the guards in the lock may be termed obstructions, which the key bitings pass. The lever lock has a dead bolt arranged with a set of levers or tumblers; these tumblers are pivoted at one end and are cut out inside; in this opening a projection from the dead bolt works back and forth; the projection on the bolt is engaged, both when locked or unlocked, by a series of projecting tongues on the tumblers. These tongues are of unequal length, and thus the notches

RECEIPT AND RETURN THIS.			
H. D. HULL,		Troy, N. Y., 189	
DEALER IN		To	
SEEDS, HARDWARE,			
AGRICULTURAL IMPLEMENTS.			
Enclosed find			
For Invoice			
" "			
" "			
" "			
Total amount,	- - -		
Less			
"			
"			
"			
Total amount,	- - -		
To balc.,			
You will oblige by signing Receipt below and returning this statement.			
Yours respectfully,		H. D. HULL.	
		189	
Received from H. D. HULL Check for			
as above.			

Form of Remittance Blank Used by H. D. Hull, Troy, N. Y.

almost entirely without the lock and confined to the escutcheon and escutcheon plug. The key in the modern escutcheon lock does not, strange as it may seem to the layman, enter the lock at all, but operates on a set of pins entirely without the lock case. Before speaking on the merits of the three different kinds of locks, it may be well to explain what is meant by the different technical terms "Guarded," "Lever" and "Escutcheon Locks." The older style, or

GUARDED LOCK

means a lock which has no tumblers or levers; the key is cut on the bit, each side having one or more notches, known as

seen in common keys—some deep, others shallow—raise the tumblers so that all the tongues are even; the bolt is then operated and the tumblers fall again, thus securing the bolt. The escutcheon lock is a term applied to a lock having a flat key and having the mechanism almost entirely without the case. The

ESCUTCHEON AND PLUG

contain the mechanism which is arranged as follows: The escutcheon is about $1\frac{1}{2}$ inches in diameter, near one edge of which a hole about $\frac{1}{2}$ inch in diameter is bored; into this the key plug is fitted. The plug is sawed lengthwise to admit the key; a series of small holes are then drilled

through the outer shell and extend into the plug, into which holes small pins, about $\frac{3}{16}$ inch diameter, are dropped and allowed to extend through the shell into the plug, thus holding the plug immovable. When these pins—which are in two parts—are lifted by the key so that the meeting points between the pins are on a line with the meeting point between the plug and escutcheon shell, the plug may be turned. The plug is connected with a cam which engages or operates on the bolt. Thus the same key that operates a lock on a jewel case may be used on the lock on the largest door, as far as size is concerned. The old-style guarded lock has become nearly obsolete, the newer forms having superseded it on account of size, insecurity and impossibility of master keying. The later

The lever lock is, generally speaking, much superior to the guarded lock, and is the one most used throughout the building trade. The average lever lock, or more properly speaking, tumbler lock, has three or more tumblers, and when this number is used, it will at once be seen how difficult an operation the picking of one would be. To pick one, the tumblers as explained in the foregoing, it must be held in such a position that each lever tongue is even with the other, and to do this is a feat that even the expert locksmiths do not care to undertake, especially in the case of a four or five tumbler lock.

LEVER LOCKS

are made with two and even one tumbler, in which cases the security is much lessened; but even then the comparison be-

small as to be easily carried, even in numbers. It may be said that the "masses" cannot afford to purchase such high grade locks, but this is a poor argument. The word lock is synonymous with security, and to have the highest degree of security is the point desired. If a man of moderate means has need for a lock at all, then the need for a good lock is apparent, as a loss to him would mean more in proportion than to a more prosperous person. Then again, the escutcheon lock in its cheapest form—which form is just as intricate as the most expensive—is not so far beyond the reach of even the humblest. An escutcheon lock may be had at the moderate sum of \$1, and this lock has just the same security as one which might cost \$10; and this is another fact that makes the escutcheon lock superior to the other styles.

THE KEY MECHANISM

is just the same throughout, from the cheapest to the most expensive, while in the lever and guarded locks the expense is regulated by the number of tumblers or the amount of biting. The contractor and builder is gradually arriving at the conclusion that it pays in the end to apply good fastenings, as the tenant is influenced to-day, more or less, by the style and make of the Hardware and locks. An instance may be cited: An elegant flat in Brooklyn, N. Y., was recently opened to the public. A prospective tenant, while inspecting the building, found fault with the locks, and proved their worthlessness by picking one of them, at the same time insisting that the hall doors be provided with flat key locks; the result was that each hall door lock throughout the building was taken off and flat key or escutcheon locks put on. The expense in doing this is obvious. This is another instance of reduction in cost by cutting the Hardware provision and paying double in the end. The locks in this case were guarded locks, and the key of same was cut and bitted until it had the appearance of being the *open sesame* to a lock of the highest security. No greater deception is practiced in lock manufacture than in the case of guarded locks and keys, and it may be said at this point: Do not purchase a lock on appearances. "Do not buy a pig in a bag." It may safely be said that 75 per cent. of the locks on the market look alike externally, but to get full value for one's money it is well to examine the internal parts, even if one is not an expert.

Our largest manufacturers advise, and in fact offer, the purchaser the opportunity of examining the mechanism of the locks and explain the workings. It is well to beware of the cheap lock maker, who, like the shoddy clothing merchant, speaks only of the general appearance.

Alaska Trade.

THE SEATTLE *Post-Intelligencer* of recent date refers to the encouraging features of trade with Alaska. It states that during the past summer Seattle has taken a step forward,

Enclosed please find check for

One Hundred Ten and 18/100 dollars \$110.18

in payment of your

Invoice July 15, 1891 \$43 17

" 17 57.18

" 21 11.69

Aug. 12 31.75

\$143.79

Less on Inv. 7/17/91-Mdse. ret'd. \$24.21

" 7/21/91-5% as quoted .58

" 8/12/91-2%, 10 ds. .63

" Frt. bills enclosed. 8.19 33.61 110.18

Please acknowledge receipt.

Very Truly,

Jansen Hasbrouck.

Form of Blank Used by Jansen Hasbrouck, Rondout, N. Y.

productions in this particular style of lock are still much used for the cheaper grades of building, and the possibility of master keying has been effected by modifying the biting, necessarily with a sacrifice of a certain amount of security. The difficulty of

MASTER KEYING

one of the old style locks will be obvious, when two of the old-time keys are held side by side and the task of making a third key to master both is considered. The degree of security in a guarded lock is, generally speaking, very slight, and a "button hook" will answer in most cases as well as a key in opening it. This of course does not apply to all guarded locks, but it does apply to the majority. Why? Because this lock is generally specified, when a cheap lock is to be used, and it follows that the mechanism of a cheap lock is of the plainest kind.

tween the lever lock and guarded lock is in favor of the lever, from the fact that the lever lock, in its plainest and simplest form, has guards as well as levers. As to the comparative price of the two styles, it may be said that while the lever lock is slightly more expensive than the guarded lock, it is not certainly cheaper in the end.

The third and most finished production in the lock line is the

ESCUTCHEON LOCK,

which is daily coming more into use, and notwithstanding the expense of this form of lock, a glance at the average bunch of keys will show conclusively that the flat key escutcheon lock is more generally favored than any other variety. This style of lock has gained its just supremacy from the facts that they are the highest in security, least likely to need repair, most easily repaired, and that the key is so

and is now said to be securing a good part of the Alaska trade, having the advantage of being nearer that territory than any other large city, with freight rates in their favor. The Pacific Coast Steamship Company charges, it is stated, \$10 a ton on goods from Seattle, \$11 from Portland and \$13 from San Francisco. A representative of the Seattle Hardware Company makes the following reference to the matter:

The trade is pretty nearly on a cash basis. The difference of \$1 a ton on freight from Portland and \$3 from San Francisco amounts to 5 cents on a keg of Nails in one instance and to 15 cents in the other. So you see that in shipping large amounts of freight Seattle is a good way ahead, for a difference of 1 cent on a keg of Nails might be enough to turn the tide in our favor. The Hardware trade with Alaska which might be reached from here amounts, I suppose, to \$75,000 a year. The main trading points are Sitka, Juneau, Fort Wrangel and New Metlakatla.

The merchants in Alaska are represented as doing a cash business with the Indians. Goods are sent by one boat and the money is usually sent for them by the return boat or the one after. The trade in this direction is on the increase, as shown by a cargo of 137 tons of freight taken from Seattle by the steamer City of Mexico on October 16, this being the largest amount she ever carried from there.

McIntosh-Huntington Co.

MCINTOSH - HUNTINGTON COMPANY, Cleveland, Ohio, have rearranged and combined the catalogues heretofore issued by them in an elegant book of 1340 pages. They have, wherever possible, given a definite number to every article, thus rendering a detailed description in ordering unnecessary. List prices have been made, wherever practicable, that will be subject to a uniform discount on each line, to give those using the catalogue an idea of the comparative value of each item. It has been the aim to bring all goods of a similar class together, and to illustrate only such articles as are carried in stock. The book is divided into eight departments, as follows:

- Locks, Latches and Builders' Hardware.
- Mechanics' and Edge Tools.
- Farming Implements and miscellaneous Hardware.
- House-Furnishing Goods and Tinner's Trimmings.
- Pocket and Table Cutlery, Razors, Scissors, Shears, &c.
- Revolvers, Ammunition and Sporting Goods.
- Iron, Steel and Blacksmiths' Hardware.
- Manufacturers' and Steam Fitters' Supplies.

The index, which is very complete in its arrangement, occupies a place near the front of the book, followed by an exhaustive Telegraph Code, embracing inquiring and purchasing questions and answers; orders and shipments questions and answers; phrases for ordering; phrases in regard to time and terms. A telegraph code of table of dates is also given, as published in "The Adams Cable Codex." Views

are given of their store fronts, as they appear on Champlain and Superior streets; also of the interior construction of their buildings, and the arrangement of the various departments. The pages of the catalogue are of a fine quality calendered paper; the typographical work is exceptionally fine, the cuts standing out with more than usual clearness and distinctness. The work is bound in cloth and leather in a substantial manner to withstand the hard usage to which a book of this kind and size is usually subject. The arrangement of the catalogue and, in fact, everything about its make up, indicates care and labor, and reflects great credit upon the firm publishing it.

Price-Lists, Circulars, &c.

EASTMAN & KRAUSS RAZOR COMPANY, 98 Chambers street, New York: Strop Catalogue. Stropps are shown in a large variety of styles, including Combination, Travelers', German Belt, Russia Leather and American Leather Belts; Reversible Swing Stropps, Combination Russia Leather and Canvas Swing Stropps, Wove Belt, Seamless Linen, Horse Hide, and other Swing Stropps. A price-list accompanies the catalogue giving net prices for the trade on these goods.

SHELBY STEEL TUBE COMPANY, Shelby, Ohio: Cold Drawn Seamless Steel Tubing. This is designed for cycle manufacture and other purposes where strength, lightness and quality are required. Tubing is made from 18 to 8 Birmingham gauge, and from 1/2 inch to 1 1/4 inches external diameter. A price-list is issued of these sizes, at price per foot. The quality of the Tubing is guaranteed by the manufacturers.

A. C. PARKER, Memphis, Tenn.: Parker's Extension Handle and Parker's Broom Hanger. The handle is designed for lengthening the handles of brooms, brushes, mops, &c., used for washing windows, sweeping walls, removing cobwebs, dusting pictures, &c. It does away with the use of step ladders or other unsatisfactory means of reaching the work. The Broom Holder is arranged to hold either end of a broom up, and may also be used to sample handled goods in a store.

CHARLES E. LITTLE, 59 Fulton street, New York: Foot and Hand Power Wood and Metal Working Machinery, Scroll Sawyers' Supplies; Tools for all trades; Brass Cabinet Hardware, Pressed Wood Ornaments, &c. These goods are illustrated in great variety, including Tool Chests, Carving Tools, &c. The catalogue is an interesting one, embodying as it does tools and machinery suitable for the use of amateurs, and also for shop work.

RECTOR & WILHELMY COMPANY, Omaha, Neb.: Plated Ware, Lamps, Cutlery, &c. Their catalogue, No. 107, presents an extensive line of these holiday goods, together with Coasters, Children's Sleighs, Skates, Flower Stands, Weather Strip and other season goods. Discounts are given on the last page, on which they also state that all the goods illustrated in the catalogue are purchased in large quantities direct from manufacturers, consequently they offer them at lowest prices.

THE STUART & PETERSON COMPANY, Philadelphia, Pa.: Hollow Ware, Ice Cream Storage Cans, Hardware Specialties, Refrigerator Tanks, Cooler Wells, &c. Enamelled Ware is an important line with this company, and they state that the ingredients composing the enamel used are so difficult to fuse that they must be applied to the Hollow Ware in iron ovens kept at a white heat, such heat as would dissolve and evaporate lead or

other poisonous metallic enamels. Among the large line of goods illustrated in their catalogue attention is particularly directed to Corridor Spittoons, Cast Iron Enamelled Ice Cream Storage Cans, Cast Iron Enamelled Covers, Vanilla Bean Boiler, Acme Evaporating Dishes, Philadelphia Hopper, Oblong Boilers, Reversible Griddle, Confectioners', Butter and Lard, Counter and Butchers' Scales.

ORR & LOCKETT HARDWARE COMPANY, Chicago, Ill.: Butchers' and Packers' Goods. Their silent drummer calls attention to their own brand of tools and special designs in fixtures and valuable suggestions are offered under the heading of "How to Order." The catalogue is liberally illustrated, showing Cooling Rooms, Market Fixtures, Sausage-Making Machinery, Meat Cutters, Meat Presses, Engines and Boilers, Lard-Rendering Kettles, General Market Tools, &c., including such goods as enter into the requirements of butchers' and packers' establishments.

GAGE TOOL COMPANY, Vineland, N. J., call attention to the fact that the steel used in their Self-Setting Plane Irons is of American manufacture and not imported. They guarantee the Irons to stand a hemlock knot to the satisfaction of the user, and it is stated that more than a hundred shavings have been taken from such a knot and then, without sharpening, the Plane Iron has cut a hair from a man's beard as a razor would.

FOSTER, STEVENS & Co., Grand Rapids, Mich., issue a budget of circulars illustrating and describing the McGuire Star Stove Pipe Thimble, Daly Snow and Stable Shovels, Atkins Saws and Saw Tools and a line of Ideal Cook Stoves.

PATTEN & COUNTRYMAN MFG. COMPANY, Dekalb, Ill.: Leader Barn Door Hanger, Ideal Hay Carrier, Tanks and Cisterns, Sections, Rivets, Sickles, Bolts, Guards, &c., for Binders, Reapers and Mowers; Hay Forks, Pulleys, Floor and Hanger Hooks, Plow Shapes, Eveners, Lever Harrows, Hay Rake Teeth, Wire Stretchers, Barrel Carts, &c.

SHEPARD HARDWARE COMPANY, Buffalo, N. Y.: A budget of circulars illustrating and describing Leap Frog Bank, Excelsior Stove Pipe Damper, Shepard's Lightning Freezer, Buttles' Tinner's Stove, Queen City Press and the Niagara Window Frame Pulley.

LOUIS W. GAY, Buffalo, N. Y.: Engineers' Supplies. This line of goods embraces Wrought-Iron Pipe, Casing and Boiler Tubes, Fittings for steam, gas and water, Brass and Iron Valves and Cocks, Boiler-Makers' and Plumbers' Tools and Supplies, Radiators, Steam and Hot-Water Heating Specialties, &c. A number of leading manufacturers in Rubber Goods, Valves, Steam Pumps, Hot-Water Heater, Cast Steel and Injectors are also represented by this firm. The catalogue is fully illustrated, showing the above named goods, is well bound and printed and contains over 160 pages. For convenience of customers a discount table is given, with the discount per cent., the equivalent in decimals and the net. Discounts are included in this table from 25 to 82 1/2 per cent., together with combinations from 2 1/2 to 10 per cent.

PRATT & LETCHWORTH, Buffalo, N. Y.: Monthly calendar for November. Representations are given of Malleable Carriage Hardware, the card in other respects being in uniformity with those preceding it.

It is Reported—

That T. P. Walter's Hardware store at Beatrice, Neb., was robbed on the 21st ult., three Shotguns, a quantity of Ammunition and some other goods being stolen.

That the Hardware firm of Trim & Douglas, Saratoga, N. Y., has been dissolved. Mr. Trim will continue the business.

That Hornby & Carmen, dealers in Hardware, Salt Lake City, Utah, were robbed on the 23d ult.

That A. Doherty & Co., wholesale dealers in Hardware, Baton Rouge, La., were burglarized recently. The amount stolen was not large.

That Alfred Truitt, a Hardware dealer at Anniston, Ala., has organized the Improved Farm Tool Company, who will handle a general line of Agricultural Implements.

That Adams & Tenney, Marlboro, N. H., have decided to add Hardware to the other lines of goods handled by them.

That the Hardware establishment of Laing & McHarry at Port Perry, Ont., was destroyed by fire on the 21st ult. The loss is estimated at \$15,000.

That J. P. Hopkins has sold his interest in the Hardware firm of Hopkins & Pabst, Eureka, Cal., to John L. Maurer of Fortuna. The firm will hereafter be known as Maurer & Pabst.

That T. E. Hayter's Hardware store at Artesian, S. D., was robbed on the 22d ult. An assortment of Revolvers, Ammunition and Pocket Knives, together with some cash, was secured by the burglars.

That August Boettcher has opened a new Hardware store at Columbus, Neb.

That the Pontiac Hardware Company, Pontiac, Mich., have been incorporated, with a capital of \$8000.

That V. Brickly of Rankin, Ill., has bought Mr. Ball's interest in the Hardware store of Ullery & Jones, Gibson, Ill.

That Jacob Schaffer & Co., Vicksburg, Miss., have sold out their Hardware stock and will hereafter confine their attention to Guns, Pistols, &c. They are now located at 214 North Washington street.

That Frank Kelly is about to open a Hardware store at Benwood, W. Va.

That Truman H. Scott, Morristown, N. J., has added a Sporting Goods department to his establishment and also a full line of Cutlery.

That a burglar broke into the Hardware store of W. J. Herman, Genesee, Idaho, on the 24th ult., blew open the safe and secured some \$300 in cash and a quantity of Cutlery and Revolvers. There is no clue to the miscreant.

That Bayless & Co.'s Hardware store at Cassville, Mo., was recently robbed of a large quantity of goods.

That Thomas & Daugherty is the name of a new Hardware firm at Creston, Iowa.

That J. L. Thorpe, lately of the Hardware firm of Thorpe & Gaston, Aiken, S. C., has opened a Hardware store in the Star Block at that point.

That H. L. Garnett's Hardware store at Chittenango, N. Y., was burglarized on the 24th ult. A quantity of Knives, Revolvers, Lanterns, Drills, &c., was stolen.

That Francis Traynor has sold the stock and good will of his Hardware business at Cambridgeport, Mass., to H. E. Fitzpatrick & Co.

That the entire stock of Hardware in the store of D. H. Buchanan, New Holland, Pa., has been purchased by the Senenig Hardware Company of Goodville, Pa., to which point it will be removed.

That R. A. Hollenberg is about to erect a new Hardware store at Irving, Kan.

That J. M. Bowie has entered the Hardware business at Dadeville, Ala.

That P. Martinson & Son's Hardware store at Lake Park, Minn., was broken into by burglars recently and the safe blown open and some \$300 or \$400 stolen.

That burglars entered H. Waruf's Gun store at Kalamazoo, Mich., on the 21st ult. and purloined about \$400 worth of goods.

That the Hardware and Gun store of John Cook, Oneida, N. Y., was entered by burglars on the 21st ult. The amount stolen was of little consequence and the offender will probably be arrested.

That P. O'Hara succeeds to the Hardware business at Lanesboro, Minn., of C. Johnson deceased.

That Ed. Wilhelmy will engage in the Hardware business at Nebraska City, Neb., with his father.

That William Treloar, Hardware dealer at Linden, Wis., has been succeeded by T. Hicks.

That W. H. Crooker has purchased the Hardware stock and fixtures of W. A. Hislop, dealer in Hardware, Unadilla, N. Y.

That H. L. Barker will start a Hardware and mixed paint store at Auburn-dale, Mass.

Paints and Colors.

It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.

Business in the general line of Paints and Colors has been remarkably good; better, if anything, than usual at this season of the year. Favorable weather conditions have contributed to this result in no small degree, permitting, as they have, almost uninterrupted outdoor work, but a noticeable improvement in the movement of specialties used by car builders, wagon and carriage makers, &c., is referred to, indicating that the good autumn season trade is not confined to house painters' goods, but extends pretty much all along the line. Some advance orders are being placed for holiday season specialties, and early results are very encouraging.

White Lead.—With the price of crude material down over $\frac{1}{2}$ ¢ per lb from that which ruled when the last advance of $\frac{1}{4}$ ¢ in White Lead prices was made, and the indications strong that crude material is down to stay, large buyers are more inclined to the opinion that corrodors' prices will be modified sooner or later. Purchases are governed accordingly by most jobbers. A steady run of small orders gives corrodors more or less advantage, since their aggregate distribution thereby kept rather above the average for the season. Competition from mixed Leads does not appear to gain headway that would alarm corrodors a great deal, although business in the cheaper pigment is better than it was a year ago, and any reduction in prices that corrodors may see fit to make would doubtless be traced to cheaper raw material.

Zincs.—Some manufacturers report having booked orders for good sized lots of American Oxide for next year's delivery at ruling prices, with a guarantee of protection to buyers in the event of any reduction in quotation before deliveries are completed. Orders for moderate quantities for early delivery come along steadily also, and, upon the whole, the market shows very good form. Foreign brands are selling at old prices and to a very fair extent.

Colors.—For the leading lines of Dry Colors used by house painters and for finer class of work there has been a good, steady demand, and prices are well maintained on all first-quality goods. Oil Colors are faring relatively as well and ready-mixed Paints sell in a fairly liberal way. Some of the leading lines of grinders' Colors are selling more freely. Prices show little change, and, with some few unimportant exceptions, the market retains a firm undertone.

Miscellaneous.—The demand for Block Chalk has changed very little, if at all, and buyers and sellers are still about $87\frac{1}{2}$ ¢ per ton apart in their views on values. Whiting is moving out freely on old contracts, and the output of grinders is thus closely absorbed, keeping prices very steady. Whiting holds its own in price and sells very fairly. The situation of the Putty market is unchanged, except that prices are steadier at the late decline.

Oils and Turpentine.

Depression in Cotton-Seed products has again figured as the one striking feature of the Oil market. In other lines there has been hardly any movement, as far as values are concerned, and business has extended beyond routine proportions in remote instances only. Irregularity in the market for Lard and inferior Greases has a certain bearing upon some lines of lubricants, but the influence thus far has been chiefly in the direction of causing cautious action on the part of buyers. Few changes in prices have taken place, at all events, and little pressure to make sales has existed in any line.

Linseed Oil.—The offering by Western and other outside crushers is remarkably temperate at the present time. Since city crushers keep their price at 37¢ for domestic seed product, their outside competitors have either to sell at a loss or leave the local field to city manufacturers. For the present the idea of doing business for glory and paying for the privilege seems to be practically abandoned by the outside interest, and a large percentage of current business goes to city crushers. Western brands are now quoted 36¢ @ 37¢ in small parcels and for carload lots 35¢ is doubtless the lowest price that would be accepted.

Cotton-Seed Oil.—The market for this class of Oils has gone from bad to worse. Receipts have been heavy, the demand has continued remarkably sluggish and neither home or foreign outlet has afforded sellers the slightest encouragement. Complete demoralization was prevented by receivers placing several round lots of Oil in store rather than sell at the prices offered, but there has nevertheless been a decline to 24¢ for prime crude and 29¢ @ 30¢ for prime Summer Yellow, with correspondingly low prices for inferior grades. Shipments to foreign countries during the past two months amounted to 1,336,000 gallons, against 727,000 gallons during the corresponding period last year.

Fish Oils.—In the Eastern markets crude Sperm and crude Whale are very firmly held, the supply there being moderate and well under control. Nearly the entire output of crude Menhaden goes out on old contracts. All the manufactured products are affected more or less by the position of the crude article, and prices remain quite firm throughout.

Lard Oil.—Irregularity in the market for raw material has kept prices for Lard Oil unsettled, but where concessions were made good orders were picked up from both export and home buyers, and the market at present is fairly active.

Miscellaneous.—Cocanut Oil is more or less unfavorably affected by the weakness in the market for competing greases, and sales of Cochin have been made at as low as $5\frac{1}{2}$ ¢ @ 6¢ on the spot. Olive Oil in barrels moves off slowly, going at as low as 60¢ to arrive and 63¢ @ 66¢ on the spot.

Spirits Turpentine.—The situation of the market is almost the same as it was a week ago. At the Southern centers prices vary to a moderate extent only, and stocks at all points keep at about the average volume. Prices here have varied to a fractional extent only.

Twin Glazier Point.

H. W. Eames Company, Milford, Mass., are introducing an improved form of glazier point, as illustrated in Fig. 1. This represents the full size of the point,



Fig. 1.—Twin Glazier Point.

which is designed for use on skylights, and for glass in greenhouses and farmers sash. Fig. 2 shows the manner of applying the point to the sash, and also the tool used for pushing the points into the window frame. It is claimed that this point will hold each pane of glass in place,

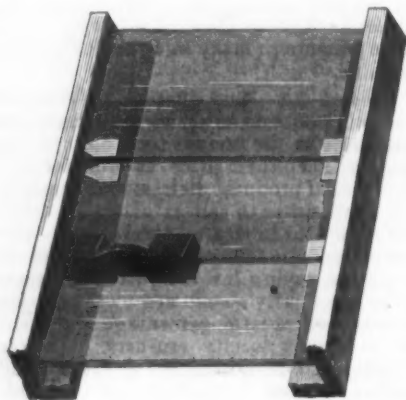


Fig. 2.—Application of Point to Sash.

and prevent their slipping, and consequently binding and cracking. The points are put up in boxes, each containing 500 rights and 500 lefts.

The Morgan Odorless Broiler.

Illustrations are herewith presented of an improved cooking utensil manufactured by the Sun Stamping Company of Kalamazoo, Mich.



The Morgan Odorless Broiler.—Fig. 1.—Broiler Opened.

It is intended for either broiling or toasting over a gas, oil, gasoline, wood or coal fire. Its construction is such that perfect cooking, it is said, can be done over a smoky fire. As shown in

Fig. 1, the essential parts of the broiler are two steel sections, each having concaved or grooved bars, with a deep channel round the rim on the inside to receive the juices of the meat. Steel covers are supplied, as shown in Fig. 2, for both top and bottom, and are corrugated to fit between the broiler bars. These covers serve the purpose of a "spreader" to the flames, prevent grease from dropping on the

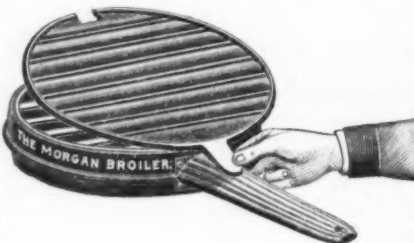


Fig. 2.—Showing Steel Cover.

burner of a gas, oil or gasoline stove and operate as a cover for a wood or coal fire, causing all fumes and odor to be drawn into the stove. As shown in Figs. 2 and 3, all parts of the broiler are connected by loose hinges, for convenience in handling and ease in cleaning. It can readily be seen that a broiler of this construction



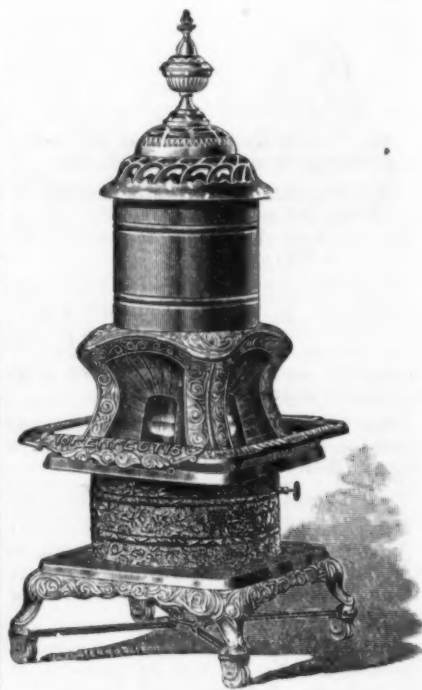
Fig. 3.—Showing Loose Hinge Connections.

possesses decided merits. It is further made entirely from sheet steel, and thus will not absorb grease or taste of previously cooked food, while it will not crack or break, and will last a life time.

The Perfect Oil Heater.

In the accompanying illustration we take pleasure in presenting a general view of an oil stove designed for heating purposes, which has just been placed upon the market by the Glazier-Strong Oil Stove Company of Chelsea, Mich. The body of the stove is made of sheet iron, the lower portion being attractively decorated by embossed ornament, while the upper or drum section is finished plain. At the burner section are four mica lights, so placed in connection with highly polished reflectors as to give the stove when in operation a very brilliant appearance. Nickel is somewhat freely employed in the ornamentation of this section of the stove and also about the base and top. A feature of construction to which the manufacturers direct special attention is the system of air circulation. The air is taken in at the bottom of the stove, passes upward around the oil reservoir placed in the base, thus keeping it cool, and unites in the combustion chamber with the burner current and moisture from the water reservoir and is discharged into the room through openings in the outer rim at the top of the stove. The arrangement is such that the portion above the burner may be tipped back for the purpose of lighting the wick or filling the tank.

While the latter operation is in progress the burner is extinguished, thus reducing the liability to accident to a minimum. The tank is made of IXX tin and its contents kept cool by the cold air which enters at the bottom of the stove. The burner is a large one, carrying a 15-inch wick. In the center is the water reservoir, cylindrical in shape, and having a capacity of about 3 pints. This reservoir, being surrounded by the flame, furnishes moisture for the air which is discharged into the room. The chimney is cone shaped and is provided with four openings, each of which registers with one of the mica windows. When it is desired to shut off the light of the stove from the room in which it stands it is only necessary to move to the left a small lever, the end of which is shown projecting from the front of the stove just below the nickel-plated rail. The shutting off of the light, however, by means of the movable chimney does not in any way interfere with the heating capacity of the stove. The top is arranged to swing off, exposing a flat top plate, which may be employed for heating a tea kettle or other vessel. The company make two sizes of the Perfect oil heater, known as Nos. 10 and 16, the one illustrated herewith being the latter size. This has a base about 18 inches square and stands about 40 inches in height. The sheet-iron drum measures about 10 inches in diameter. The manufacturers refer to this stove as being very powerful in operation and economical in the use of fuel. In connection with these stoves the company make a truck designed especially



The Perfect Oil Heater.

for their goods and by means of which the stoves may be readily and easily moved from one position to another. As will be seen from an inspection of the engraving, the Perfect oil heater presents a very attractive appearance, and we understand the company are meeting with a very large demand for it. They state that in the last three months they have increased their capacity so that at the present time they are able to turn out 200 completed stoves per day. In connection with their works is a large nickel plating plant, enabling them to do their own work with entire satisfaction. The company state that at the present time they find difficulty in filling orders, but when they get their increased capacity fully under way they will be in a position to promptly meet the demands of their customers.

Cold Forged Coach Screw.

The American Screw Company, Providence, R. I., are offering the trade an improved form of coach screw, as illustrated herewith. Among the advantages possessed by this form over the old style, may be noticed the centralized point, which allows it to be started evenly and easily; the taper shank, which better adapts it for holding; the thin deep thread, which

there is nothing to get out of order, and that they are put on in half the time required for putting on the old-style hinge.

To Test the Ferry Boat Cincinnati.

The Pennsylvania Railroad Company have issued invitations for the trial trip of the new double deck screw propeller ferry boat Cincinnati on the 7th. This boat has a length over guards of 206 feet, length of



Cold Forged Coach Screw.

causes it to enter the wood more readily, and with less destruction of fiber, and the metallic skin covering the surface, which is a result of the cold forging process. The fact will be appreciated, that in this process the material is not cut away to secure the thread, but that the thread is forged or pressed to the required thinness.

The Kelsey Noiseless Hinge.

The Kelsey Hinge Company, Granby, Conn., are offering this blind hinge, the parts of which are illustrated in Figs. 1 and 2. The part shown in Fig. 1 is screwed on to the blind, and a $\frac{1}{4}$ -inch hole is bored into the casing to receive the



Fig. 1.—The Kelsey Noiseless Hinge.

cylinder part of Fig. 2, after which screws secure it in place. The cylinder contains a heavy coil spring against which rests the plug, as seen between the hooked projections. The shank of Fig. 1 is pivoted in the hooks and compresses the spring as the blind is opened or closed. The shank presents a square surface to the head of the plug at three points, the pressure of the spring holding the blind closed, half open, or entirely open, as desired. With this hinge no catches, staples or fasts are needed, and the blinds will

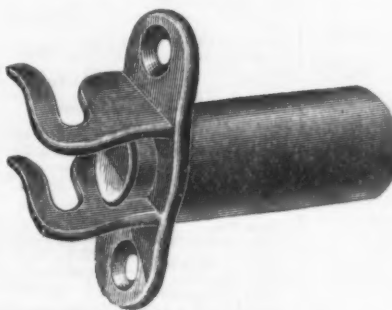


Fig. 2.—The Kelsey Noiseless Hinge.

stay half open, which is an advantage where mullion and bay windows are used, or windows near piazza posts. The manufacturers claim with this hinge that there is no slamming or rattling of blinds; that

hull, 200 feet; beam over guards, 65 feet; beam of hull, 46 feet; depth from deck to keel, 17 feet; draft, 10 feet 10 inches, displacement, 890 tons. The motive power consists of two steep compound engines, each having cylinder 18 x 36 inches and stroke of 26 inches. The shaft extends the full length of the boat and has sectional propeller wheels at each end. The shafts are coupled between the engines, so that in case of accident to either engine or shaft they can be disconnected and used independently. In our issue of next week we will present a fully illustrated description of the principal features of the boat.

Cellulose.

This substance, by reason of its light weight and the rapidity with which it expands when brought into contact with water, is largely used as a backing for war vessels. It is the ground fiber of the cocoanut which has been treated for the removal of glutinous matter. When a shot has been fired through it, the water which comes pouring into the hole left by the projectile aids in repairing the damage done, and in a short time the orifice is as tight as could be desired.

It is used either in ordinary form mixed with an additional 6 per cent., by weight, of cocoanut fiber, or compressed into so-called briquettes, the sides of which are about $\frac{1}{2}$ inch thick, and filled with loose cellulose. In the ordinary form it will burn slowly, but when in a compressed state it is almost totally non-combustible. Its specific gravity is very low, a cubic foot of the ordinary article weighing but 7.5 pounds, while a briquette of a cubic foot weighs 8.1 pounds. When packed in compartments, it is preserved from direct contact with the metal of the ship by a thick coating of paint (applied to the latter), as if dampened from leaks or otherwise the portion in contact with the metal will deteriorate.

The warships of France, Germany and Russia are all provided with armors of it. Cruiser No. 9, now in course of construction at the Cramp yards, is to be furnished with a belt of it 5 feet thick at the water mark.

The construction of huge shafts for the new Cunarders was begun last week by Vickers & Son of Sheffield. Each shaft will be 32 inches in diameter, of which 6 inches is solid steel, the hollow core being 20 inches. Each vessel will carry two exact duplicates of the Etruria's engines, each of them of 14,000 horse power. These engines are guaranteed to give a sustained speed of 21 knots in open sea, 22 $\frac{1}{2}$ measured miles on trial trip. First of the new vessels will be ready for trial trip one year from next December, the other early the year following.

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NOVEMBER 4, 1891

Churns.
Twin Union, each, 5 gal. \$3.25; 7 gal. \$3.75; 10 gal. \$4.25.

Clamps—		Draw Cut, each:		Enamelled and Tinned Ware—		Fuse-Dia. 12½.	
A. I. Tool Co.'s Wrought Iron.....		Nos. 5 2 6 8		See Ware, Hollow.		Common Hemp Fuse, for dry ground.....	
Adjustable, Cincinnati.....		\$50 \$75 \$80 \$225.....		Escutcheon Pins—See Pins, Es-		Common Cotton Fuse, for dry ground.....	
Adjustable, Hammers.....		30¢10¢25¢		cutcheon.		Single Taped Fuse, for wet ground.....	
Adjustable, Stearn's.....		Beef Shavers (Enterprises).....		Kneutcheons.		Double Taped Fuse, for very wet gr. 4.5	
Stearns' Adjustable Cabinet and Cor-		Little Giant (P. S. & W. Co.).....		Door Lock..... Same dia as Door Locks.		Triple Taped Fuse, for very wet gr. 5.0	
ner.....		30¢10¢40¢10¢		Brass Thread.....		Small Gutta Percha Fuse, for water. 7.0	
Cabinet, Sargent's.....		30¢40¢10¢		Wood.....		Large Gutta Percha Fuse, for water.....	
Carriage Makers', Sargent's.....		60¢80¢10¢		Expanded Metal.		Gates, Molasses—	
Carriage Makers', P. S. & W. Co.....		70¢10¢		List No. 5.		Stebbin's Pattern.....	
Eberhard Mfg. Co.....		40¢5¢40¢10¢		Lathing.....		Stebbin's Genuine.....	
Warner's.....		40¢5¢40¢10¢		Fencing, Painted Sheets.....		Stebbin's Tinned Ends.....	
Saw Clamps, see Vices, Saw Filers'.		40¢10¢40¢10¢5¢		Netting, Painted Sheets.....		Chase's Hard Metal.....	
Carpenters', Cincinnati.....		25¢10¢		Door Mats, Galvanized.....		Bush's.....	
Cleavers.		Tobacco.		Window Guards, Paneled.....		Lincoln's Pattern.....	
Butchers'.		Champion.....		Trey Guards, Paneled.....		Wood's.....	
Bradley's.....		30¢10¢30¢		Penny's.....		Boss, per doz.....	
L. & J. White.....		30¢10¢		Extractor, Lemon Juice—See		No. 1, 87; No. 2, 88; No. 3, 89; No. 4,	
Beatty's.....		30¢10¢		Squeezers, Lemon.		810.....	
New Haven Edge Tool Co.'s.....		40¢		Fasteners, Blind—		Gauges.	
P. S. & W.....		33¢45¢33¢10¢		Mackrell's, per doz. \$1.00.....		Marking, Mortise, &c.....	
Foster Bros.....		30¢		Van Sand's Screw Pat. \$15 per gr. 60¢10¢		Starrett's Surface, Center and Scratch.	
Schulte, Lohoff & Co.....		40¢40¢5¢		Van Sand's Old Pat., \$15.00 per gr. 65¢10¢		25¢10¢	
Clips—		Norway, Axle, ¼ & 5-16.....		Washburn's Old Pattern, per gr.....		Wire, Wheeler, Madden & Co.....	
55¢55¢5¢		55¢55¢		Austin & Edry No. 2008 per gr.....		Wire, Morse's.....	
2nd grade Norway Axle, ¼ & 5-16.....		65¢55¢		Security Gravity, per gr.....		Wire, Brown & Sharpe's.....	
65¢55¢		60¢55¢70¢		Faucets.—		Wire, P. S. & W. Co.....	
superior Axle Clips.....		60¢55¢		Fenn's.....		Glimties—	
60¢55¢70¢		60¢55¢		Bohren's Pat. Rubber Ball.....		Nail and Spike.....	
Norway Spring Bar Clips, 5-16.....		60¢55¢		Fenn's Cork Stops.....		"Eureka" Glimties.....	
60¢55¢		60¢55¢		Star.....		"Diamond" Glimties.....	
Wrought-Iron Felloe Clips.....		5¢		Frary's Pat. Petroleum.....		Double Cut, Shepardson's.....	
5¢		5¢		B. & L. B. Co.		Double Cut, Vestal.....	
steel Felloe Clips.....		5¢		West's Lock, Open and Shut Key.....		Double Cut, Douglas.....	
5¢		5¢		Star, Metal Plug, new list.....		"Bea" per doz.....	
Saker Axle Clips.....		25¢		Lockport, Metal Plug, reduced list.....		Glue—	
25¢		25¢		Metallic Key, Leather Lined.....		Le Page's Liquid.....	
Cloth and Netting, Wire—See		Dampers, Buffalo.....		Cork Lined.....		Upton's Liquid.....	
Wire, &c.		40¢10¢		Burnside's Red Cedar.....		Improved Process.....	
Cockeyes.....		50¢		Burnside's Red Cedar, bbl lots.....		Glue Pots—See Pots, Glue.	
Cocks, Brass.		40¢		John Sommers'.....		Grease, Axle.	
Hardware list.....		50¢		Peerless Best Block Tin Key.....		Fraser's.....	
Coffee Mills—See Mills, Coffee		50¢		LXL, list quality, Cork Lined.....		Fraser's, in boxes.....	
Collars, Dog, &c.		50¢		Diamond Lock, Red Cedar.....		Dixon's Everlasting, in box.....	
Medford Fancy Goods Co.....		40¢10¢		Goodenough Cedar.....		Dixon's Everlasting, in box.....	
Embossed, Gift, Pope & Steven's list		30¢10¢		Boss Metallic Key.....		Lower grades, special brands.	
30¢10¢		40¢		Reliable Cork Lined.....		per gr \$5.00, \$7.00.	
Leather, Pope & Steven's list.....		40¢		Western Pattern Cork Lined.....		Grindstones—	
Brass, Pope & Steven's list.....		40¢		Self-Measuring.....		Small, at factory.....	
Chapman Mfg. Company.....		50¢10¢60¢		Lane's, per doz \$5.00.....		Family, Cleveland Stone Co.....	
Combs, Curry.		50¢10¢		Victor, per doz \$36.00.....		Grindstone Fixtures—See Fixture.	
Fitch's.....		60¢10¢50¢10¢10¢		Felloe Plates—See Plates, Felloe.		Grindstone.	
Rubber, per doz \$10.00.....		20¢		Fifth Wheels.—		Hack Saws—See Saws.	
Perfect.....		50¢		Derby and Cincinnati.....		Hafts, Awt.	
Kellogg's.....		50¢10¢		Brewster.....		Sewing, Brass Fer. per gr. \$3.50.....	
Sweet & Clark's.....		50¢10¢		Files.—		Pat. Sewing, Short, \$1.00 per doz.....	
Sweet & Clark's.....		50¢10¢		Domestic.....		Pat. Sewing, Long.....	
Compasses, Dividers, &c.—		50¢10¢		Nicholson Files, Rasps, &c.....		Pat. Sewing, Long.....	
Compasses, Callipers, Dividers.....		70¢10¢10¢		Nicholson (X. F.) Files.....		Pat. Peg, Plain Top, per gr \$10.00.....	
Bemis & Call Co.'s		60¢10¢		Nicholson's Royal Files (Second).....		Pat. Peg, Leather Top, per gr \$12.00.....	
Dividers.....		60¢5¢		(extra prices on certain sizes)		Halters.	
Compasses & Callipers.....		50¢5¢		G. & H. Barnett (Black Diamond).....		Cover's, Rope, Jute.....	
Wing and Inside or Outside.....		50¢5¢		Eagle.....		Cover's, Rope, 7-16-in. Jute.....	
Double.....		60¢		Other makers, best brands.....		Cover's, Rope, 1/4-in. Hemp.....	
(Call's Pat. Inside).....		30¢		Fair brands.....		Cover's, Adj. Rope Halters.....	
Excelsior.....		30¢		Second quality.....		Cover's Hemp Horse and Cattle Tie.	
J. Stevens & Co.'s.....		35¢10¢		Heller's Horse Rasps.....		Cover's Jute Horse Ties.....	
Starrett's		25¢10¢		McCauley's Horse Rasps.....		Cover's Jute Cattle Tie.....	
Spring Callipers and Dividers.....		25¢10¢		Cheese Horse Rasps, Hand Cut.....		Cover's Adj. Web Halters.....	
Lock Callipers and Dividers.....		25¢		Imported—		Hammers—	
Combination Dividers.....		25¢		Moss, Sample.....		Handled Hammers—	
Coopers' Tools—See Tools, Coopers'.		25¢		Butcher.....		Maydole's, list Dec. 1, '85.....	
Cord—		25¢		Stubbs.....		Buffalo Hammer Co.....	
Sash.		25¢		Turton's.....		Hudson & Beckley.....	
Common.....		10¢ 10¢ 11¢		Greaves' Horse Rasps, American list, 60¢		Atha Tool Co.....	
Patent, good quality.....		12¢ 12¢ 12¢		Fixtures.		Verree.....	
White Cotton Braided, fair.....		24¢ 24¢ 25¢		Grindstone—		C. Hammond & Son.....	
Common Russia Sash.....		12¢ 12¢ 13¢		Sargent's Patent.....		Fayette R. Plumb.	
Patent Russia Sash.....		14¢		Best Hardware Co.....		Artisan's Choice, A. E. Nail.....	
Cable Laid Italian Sash.....		21¢ 21¢		P. S. & W. Co.....		Beck's Y & P. A. E. Nail.....	
India Cable Laid Sash.....		12¢ 12¢		Fluting Machines—See Machines,		Horseshoe Turning Hammers.....	
Silver Laid.....		12¢		Fluting.		Other Hammers.....	
A Quality, White, 50¢.....		25¢		Fluting Scissors—See Scissors,		Hartford, Nail Hammers.....	
A Quality, Drab, 55¢.....		25¢		Fluting.		Hartford, Machinists, &c.....	
B Quality, White, 30¢.....		10¢		Fodder Squeezers—See Squeezers,		Magnetic Tack, Nos. 1, 2, 3, \$1.25, 1.50 &	
B Quality, Drab, 35¢.....		10¢		Fodder.		1.75.....	
Sylvan Spring Extra Braided White, 34¢				Forks—		Warner & Nobles.....	
Sylvan Spring, Extra Braided, Drab, 30¢				Hay, Manure, &c., Asso List, 65¢5¢10¢		Pest, Stow & Wilcox.....	
Semper Idem, Braided, White.....		30¢		Hay, Manure, &c., Phila. List, 60¢60¢5¢		Sargent's.....	
Egyptian, India Hemp, Braided.....		30¢		Plated, see Spoons.		Heavy Hammers and Sledges—	
Massachusetts, White.....		20¢		Frames—		3 lb and under.....	
Samson.....		20¢		Saw—		4 lb 5 lb.....	
Braided, White Cotton, 50¢.....		30¢50¢5¢		Screen, Window and Door—		Wilkinson's Smiths.....	
Braided, Drab Cotton, 55¢.....		30¢50¢5¢		Porter's Pat. Window and Door Frame.....		Handcuffs and Locks—See	
Braided, Italian Hemp, 55¢.....		30¢50¢5¢		Warner's Screen Corner Irons.....		Police Goods.	
Braided, Linen, 80¢.....		30¢50¢5¢		Stearns' Frames and Corners.....		Handles—	
Tate's Cotton Braided, White.....		25¢		Cortland.....		Cross-Cut Saw Handles—	
Wire Picture.		75¢10¢		Freezers, Ice Cream—		Atkins' No. 1 Loop, per pair, 28¢; No. 2	
Corkscrews—See Screws, Cork.		75¢10¢		White Mountain.....		13¢; No. 6, 16¢; No. 3 and No. 4	
Cork Knives and Cutters—See		75¢10¢		Granite State.....		Reversible, 13¢.	
Knives, Cork.		75¢10¢		Arctic.....		Boynton's Loop Saw Handles, 50¢.....	
Crackers, Nut—		75¢10¢		American.....		Champion.....	
Table (H. & B. Mfg. Co.).....		40¢		Buffalo Champion.....		Iron, Wrought or Cast—	
Blake's Pattern.....		50¢		Shepard's Lightning.....		Door or Thumb.	
Turner & Seymour Mfg. Co.....		50¢		Gem.....		Nos.....	
Cradles—		50¢55¢50¢10¢25¢		Glen.....		Per doz.....	
Grain.....		50¢55¢50¢10¢25¢		Hillard.....		0 1 2 3 4	
Crayons.		50¢55¢50¢10¢25¢		Double Action Crown.....		1 1.1 1.3 1.5 1.6	
White Crayons, gross.....		10¢		Crown.....		80¢10¢	
D. M. Stewart Mfg. Co., Metal Work- ers, per gr. \$2.50.....		25¢		Star.....		Hoggin's Latches.....	
D. M. Stewart Mfg. Co., Rolling Mill, per gr. \$2.50.....		100 150		Peerless.....		Bronze Iron Drop Latches.....	
See also Chalk.....		150 160		Giant.....		Jap'd Store Door Handles, per doz.....	
Crow Bars—See Bars, Crow.		150 160		Zero.....		Plate, \$1.10; no Plate, \$0.88.....	
Curry Combs—See Combs, Curry.		150 160		Keystone, P. D. & Co., each \$1.50.....		Sarn Door, per doz \$1.40.....	
Curtain Pins—See Pins, Curtain		150 160		Fruit and Jelly Presses—See		Chest and Lifting.....	
Utensils—		150 160		Presses, Fruit and Jelly.		Wood—	
Meat.		150 160		Fry Pans—See Pans, Fry.		Saw and Plane.....	
Dixon's per doz.....		40¢25¢		Funnel.		Hammer, Hatchet, Axe, Sledge, &c.....	
Nos.....		1 2 3 4		Gersdorf's Perfection, Standard and		Brad Acker, Durium.....	
\$1.00 \$1.70 \$1.00 \$3.00				Globe; 7 1/4, 1 gro., 10; 2 to 5 gro.,		Hickory Firmer Chisel, ass'd, per 4.50	
Woodruff's per doz.....		40¢25¢		30; 5 to 10 gro., 10; 2 to 5 gro.,		Hickory Firmer Chisel, large, per 5.00	
Nos.....		100 150		Copper, 1 to 6 doz, 15; 6 to 12		Apple Firmer Chisel, ass'd, per 5.00	
\$15.00 \$18.00				doz, 30; over 12 doz.....		Apple Firmer Chisel, large, per 6.00	
Hales Pattern per doz.....		70¢70¢5¢		Furnaces, Soldering.		Socket Firmer Chisel, ass'd, per 3.00	
Nos.....		11 12 13		Burgess No. 3 Gem, tin reservoir.....		Socket Framing Chisel, ass'd, per 5.00	
\$27.00 \$33.00 \$45.00				Burgess No. 3 Gem, copper reservoir, 8.50		I. S. Smith & Co.'s Pat File.....	
American.....		80¢		Fruit and Jelly Presses—See		File, assorted.....	
Nos.....		1 2 3 4 5 6		Presses, Fruit and Jelly.		Auger, assorted.....	
Each.....		\$5 \$7 \$10 \$25 \$50 \$80		Fry Pans—See Pans, Fry.		Auger, large.....	
Enterprise.....		80¢		Funnel.		Pat. Auger, Ives.....	
Nos.....		10 12 22 32 42		Gersdorf's Perfection, Standard and		Pat. Auger, Swan's.....	
Each.....		\$3 \$2.50 \$4 \$5 \$6 \$15		Globe; 7 1/4, 1 gro., 10; 2 to 5 gro.,		Hoe, Rake, Shovel, &c.....	
Great American Meat Cutter.....		30¢		30; 5 to 10 gro., 10; 2 to 5 gro.,			
Nos.....		112 116 118 120 122		Copper, 1 to 6 doz, 15; 6 to 12			
Each.....		\$2.00 \$2.75 \$3.00 \$2.50 \$4.00		doz, 30; over 12 doz.....			
Miles' Challenge.....		45¢45¢10¢		Furnaces, Soldering.			
Nos.....		1 2 3		Burgess No. 3 Gem, tin reservoir.....			
\$23.00 \$30.00 \$40.00				Burgess No. 3 Gem, copper reservoir, 8.50			
Home No.....		per doz \$26.00, 55¢10¢					

Mallets.
Hickory.....30&10@30&10&10
Lignumvitae.....30&10@30&10&10
B. & L. Block Co., Hickory & L. V.
.....30&10@30&10&10

Hatchets, Regular List.
60&10@10&10&5

Measures.
Standard Fiberware, No. 1, peck, 7
dosen, 44; 1/2 peck, \$3.60.

Meat Cutters—See Cutters, Meat.

Menders, Harness—
Per dos.....\$2.00

Mills.
Coffee—

Box and Side, List Jan. 1, 1888, 60&10@—
American, Enterprise Mfg Co. 30&10@30&10
The Swift, Lane Bros.....30&10@

Mining Knives—See Knives,
Mining.

Molasses Gates—See Gates, Mo-
lasses.

Money Drawers—See Drawers,
Money.

Mowers, Lawn.

Pennsylvania, New Model, Excelsior,
Continental, &c.....60&10@5
Philadelphia.....60&10@10
Perfection.....60&10@10
Easy.....60&10@60&10&5
Bay State.....60&10@60&10&5
Other Machines.....60&10@5@70&5

Muzzles—
Safety.....7 dos, \$3.00, 25 1/2

Nails.
Cut and Wire, See Trade Report.

Wire Nails, Papered.

Association list, July 15, '89, 75&10@80&10
Tack Mfrs' list.....70&70&10@

Wire Nails, Standard Penny.

Card June 1 '89 base.....\$2.10 @ \$2.20

Horse—
Nos. 6 7 8 9 10

Ausable.....23&26 25&24 23&24

Clinton, Fin. 19&17 16&15 14&13

Essex.....23&26 25&24 23&24

Lyra.....19&17 16&15 14&13

Snowden 19&17 16&15 14&13

Putnam.....23&26 25&24 23&24

Vulcan.....23&26 25&24 23&24

Northwest.....23&26 25&24 23&24

Globe.....23&26 25&24 23&24

Boston.....23&26 25&24 23&24

A. C.....25&28 23&22 21&21

C. B.-K.....25&28 23&22 21&21

Maud S.....25&28 23&22 21&21

Champlain.....23&26 25&24 23&24

Saranac.....23&26 25&24 23&24

Champion.....23&26 25&24 23&24

Capewell.....23&26 25&24 23&24

Star.....23&26 25&24 23&24

Anchor.....23&26 25&24 23&24

Western.....23&26 25&24 23&24

Empire Bronzed.....14 1/2

Picture—

Brass Head, Sargent's list.....50&10@10&5

Brass Head, Combination list.....50&10@10&5

Porcelain Head, Sargent's list.....50&10@10&5

Porcelain Head, Combination list.....50&10@10&5

Siles' Patent.....40&10@

Nail Pullers.—See Pullers, Nail.

Nail Sets.—See Sets, Nail.

Nut Crackers.—See Crackers, Nut.

Nuts—List Dec. 18, 1889.

Square, Hex.

Hot Pressed.....5.50 5.90 off list.

Cold Punched.....5.00 5.10 off list.

In packages of 100, add 1-10¢, 1/2

net; in packages less than 100, add

1/4¢ 1/2 net.

Oakum—
Best or Government.....7 1/2 @ 7 1/4

U. S. Navy.....6 1/2 @ 6 1/4

Navy.....6 1/2 @ 6 1/4

Oilers—

Zinc and Tin.....65&10@70&5

Brass and Copper.....50&10@50&10&5

Malleable, Hammers' Improved, No. 1,

\$3.60, No. 2, \$4.00; No. 3, \$4.40 1/2 dos.

Malleable, Hammers, Old Pattern, same

list.....40&10@

Prior's Pat. or "Paragon" Zinc,

60&10@10&5

Olmstead's Tin and Zinc.....60&10@

Olmstead's Brass and Copper.....60&10@

Broughton's Zinc.....60&10@

Broughton's Brass.....60&10@

Gem P. D. & Co.....7 gro, 12

Steel, Draper and Williams.....50&10@

Openers, Can.

Messenger's Comet.....7 dos \$3.00, 25&10@

American.....7 dos \$3.00, 25&10@

Duplex.....7 dos \$3.00, 25&10@

Lyman's.....7 dos \$3.00, 25&10@

No. 1, French.....7 dos \$3.00, 25&10@

No. 2, Iron Handle.....7 dos \$3.00, 25&10@

Eureka.....7 dos \$3.00, 25&10@

Sardine Belmors.....7 dos \$3.00, 25&10@

Star.....7 dos \$3.00, 25&10@

Sprague, No. 1, \$2.50, 2, \$2.25, 3, \$2.00

Excelsior No. 1, \$2.50, 2, \$2.00, 3, \$1.50

World's Best, 7 gross, No. 1, \$12.00

No. 2, \$24.00; No. 3, \$36.00, 60&10@

Universal, 7 dos \$3.00, 25&10@

Domestic, 7 dos \$2.50, 25&10@

Champion 7 dos \$2.00, 25&10@

Packing, Steam—

Rubber—

Standard.....60&10@55&5

Extra.....60&10@55&5

N. Y. B. & P. Co., Standard.....50&10@

N. Y. B. & P. Co., Empire.....50&10@

N. Y. B. & P. Co., Salamander.....25&10@

Jenkins' Standard, 7 1/2 dos.....25&10@55&5

Amocoilons—

American Packing.....10&11@ 1/2

Russia Packing.....14 1/2 @ 1/2

Atlas Packing.....13&14@ 1/2

Union Packing.....15&17@ 1/2

Julia.....7&8@ 1/2

Padlocks—See Locks.

Pails.

Galvanized Iron—

Quarts 10 12 14

Bill's Light Weight, 7 dos, \$2.75 3.00 3.25

Bill's Heavy Weight, 7 dos, 3.00 3.25 3.75

Helwig's.....2.50 2.75 3.00

Sidney, Shepard & Co.....2.35 2.85 3.05

Iron Clad.....2.50 2.75 3.00

Fire Buckets.....2.75 3.25 3.50

Buckets, see Well Buckets.

Indurated Fibre Ware—35¢

Star Pails, 12 qt.....7 dos \$5.40

Stable and Milk, 14 qt.....7 dos \$6.10

Fire Pails, deep.....7 dos \$5.40

" round bottom.....7 dos \$7.30

Standard Fibre Ware—

Water Pails, 12 qt, per dos, \$4.00 Decr'd

Dairy Pails, 14 qt, per dos, 4.50 5.00

Fire Pails, No. 1, 12 qt, per dos, 4.50

Fire Pails, No. 2, 14 qt, per dos, 5.00

Sugar Pails.....6.00 6.50

Horse Pails.....5.00

Buggy Pails.....4.00

Slop Jars (bal. trap).....8.00 9.00

Chamber Pails, 14 qt.....6.50 7.50

Pans.

Dripping.

Small sizes.....7 dos 6 1/2

Large sizes.....7 dos 5 1/2

Silver & Co. (Covered).....40&10@

Fry—

Standard List:

No.....1 2 3 4

7 dos, \$3.00 \$3.75 \$4.35 \$4.75 \$5.25

No.....5 6 7 8

7 dos, \$6.00 \$7.00 \$8.00 \$9.00

Polished, regular goods.....75&75&10@

Acme Fry Pans.....60&10@

Dust—

Steel Edge, No. 1.....7 dos \$1.75

Paper and Cloth—

Sand and Emery—

List April 19, 1888.....50&50&10@

Sibley's Emery and Crocus Cloth.....30&10@

Parers.

Apple.

Advance.....7 dos \$4.75

Baldwin.....7 dos 5.25

Bonanza.....each 5.00

Daisy.....7 dos 4.00

Dandy.....each 7.50

Eureka.....each 16.00

Family Bay State.....7 dos 12.00

Favorite.....7 dos 5.00

Gold Medal.....7 dos 4.00

Ideal.....7 dos 4.00

Improved Bay State.....7 dos \$7.00 @ \$8.00

Little Star.....7 dos 4.50

Monarch.....7 dos 13.50

New Lightning.....7 dos 5.50

Oriole.....7 dos 4.00

Penn.....7 dos 4.00

Perfection.....7 dos 4.00

Pomona.....7 dos 4.00

Rocking Table.....7 dos 4.50

Turn Table.....7 dos 4.50

Victor.....7 dos 13.50

Waverly.....7 dos 4.00

White Mountain.....7 dos 4.25

78.....7 dos 7.00

White Mountain.....7 dos \$4.50

Antrim Combination.....7 dos \$5.50

Hoodier.....7 dos \$13.50

Saratoga.....7 dos \$5.50

Pencils—

Faber's Carpenters'.....high list 50¢

Faber's Round Gilt.....7 gro \$5.25

Dixon's Lead.....7 gro \$4.50

Dixon's Lumber.....7 gro \$7.75

Dixon's Carpenters'.....10¢

Picks—

Railroad or Adse Eye, 5 to 6, \$12.00;

6 to 7, \$13.00.....60&10@60&10&5

Picture Nails.—See Nails, Picture.

Pinking Irons.—See Irons, Pinking.

Pins.

Humason, Beckley & Co.'s.....60&10@

Sargent & Co.'s.....\$17 and \$18.....60&10@

Peck, Stow & W. Co.....50&10@50&10&5

Curtain—

Silvered Glass.....net

White Enamel.....net

Sawedches.

Iron, list Nov. 11, 1888.....50&10@50&10&5

Brass.....60&10@50&10&5

Pipe, Wrought Iron—

List September 18, 1889.

1 1/2 and under, Plain.....57 1/2

1 1/2 and under, Galvanized.....47 1/2

1 1/2 and over, Plain.....47 1/2

1 1/2 and over, Galvanized.....55 1/2

Boiler Tubes.

Sizes up to 2 1/2 in. inclusive.....55 1/2

Sizes 3 to 6 in. inclusive.....55 1/2

Sizes 7 in. and up.....55 1/2

Cashin.....55 1/2

Steel Boiler Tubes.....20¢

Planes and Plane Irons—

Wood Planes—

Molding.....40&10@

Bench, First Quality.....50&10@

Bench, Second Quality.....55&10@

Bailley's (Stanley R. & L. Co.).....40&10@

Iron Planes—

Bailley's (Stanley R. & L. Co.).....7 dos \$2.75

Miscellaneous Planes (Stanley R. & L. Co.).....20&10@20&10&10

Victor Planes (Stanley R. & L. Co.).....20&10@20&10&10

Steel's Iron Planes.....35&35&10@

Merriam's Iron Co.'s.....40&40&10@

Dackley's Iron Planes.....40&40&10@

Birmingham Plane Co.....50&50&10@

Gage Tool Co.'s Self-Setting.....20&10@10&5

Chaplin's Iron Planes.....40&40&10@

Sargent's.....30&10@30&10&10

Standard Tool Co.....50&50&10@

Hack Saws—
Griffin's, complete.....40¢10¢50¢
Griffin's Hack Saw, Blades.....40¢10¢50¢
Star Hack Saws and Blades.....25¢
Eureka and Crescent.....25¢

Scroll—
Lester, complete, \$10.00.....25¢
Bogers, complete, \$4.00.....25¢
Barnes' Builders' and Cab. Makers' \$15.25¢
Barnes' Scroll Saw Blades.....35¢

Saw Frames—See Frames, Saw.

Saw Sets—See Sets, Saw.

Saw Tools—See Tools, Saw.

Scales—

Hatch, Counter, No. 171, good quality, \$ dos \$21.00
Hatch, Tea, No. 161.....\$ dos \$6.75¢\$7.00
Union Platform, Plain.....\$2.10¢\$2.20
Union Platform, Striped.....\$3.40¢\$3.50
Chattillon's Grocers' Trip Scales.....50¢
Chattillon's Scales, 100 lb. Co.....\$2.10¢
Chattillon's Favorite.....40¢
Family, Turnbulla.....\$0.80¢\$1.00
Richie Bros.' Platform.....40¢

Scale Beams—See Beams, Scale.

Scissors, Fluting.....45¢

Scrapers—

Adjustable Box Scraper (R. R. & L. Co.) \$ dos \$3.00
Box, 1 Handle.....\$ dos \$4.00, 10¢
Box, 2 Handles.....\$ dos \$5.00, 10¢
Defiance Box and Scraper.....\$2.10¢
Foot.....\$0.80¢\$1.00
Ship, Common.....\$ dos \$3.50 net
Ship, R. I. Tool Co.....10¢

Screen Window and Door

Frames—See Frames.

Screw Drivers—See Drivers, Screw.

Screws.

Bench and Hand—

Bench, Iron.....55¢10¢55¢10¢10¢
Bench, Wood, Beech.....\$ dos \$2.25
Bench, Wood, Hickory.....\$ dos \$2.00, 10¢
Hand, Wood.....\$2.10¢\$2.10¢
Hand, Grand Rapids, Ist.....5¢
Lag, Hunt Point, Ist Jan. 1, 1890, 75¢10¢
Coach and Lag, Gimlet Point, Ist Jan. 1, 1890.....75¢75¢10¢
Bed.....25¢5¢
Hand Rail, Rogers.....60¢10¢
Hand Rail, B. & F. Mfg. Co.....70¢10¢75¢
Hand Rail, Am. Screw Co.....75¢
Jack Screws, Millers Falls Ist.....50¢50¢5¢
Jack Screws, P. S. & W.....35¢
Jack Screws, Sargent.....60¢10¢60¢10¢5¢
Jack Screws, Stearns.....40¢40¢10¢

Cork—

Humason & Beckley Mfg. Co. 40¢10¢50¢
Williamson's.....35¢40¢35¢5¢
Hows Bros. & Hulbert.....35¢

Machine—

Flat Head, Iron.....55¢

Round Head, Iron.....50¢

Wood—

List January 1, 1891.

Flat Head Iron.....72¢10¢

Round Head Iron.....67¢10¢

Flat Head Brass.....72¢10¢

Round Head Brass.....65¢

Flat Head Bronze.....73¢10¢

Round Head Bronze.....73¢10¢

Rovers' Drive Screws.....83¢10¢

Scroll Saws—See Saws, Scroll.

Scythes.

Grass.....40¢25¢40¢10¢
Grass.....40¢10¢50¢

Scythe Snaths—See Snaths, Scythe

Seis.

Awl and Tool.

Aiken's Sets, Awns and Tools.....55¢10¢
No. 20, \$ dos \$10.00.....55¢10¢
Pray's Adj. Tool Hds., Nos. 1, 113, 2, 113, 3, 113, 4, 113.....25¢40¢10¢
Miller's Falls Adj. Tool Hds.....25¢
No. 1, 113, 2, 113.....25¢
Henry's Combination Haft.....\$ dos \$6.50
Stanley's Excelsior.....\$ dos \$1.75, No. 2, \$4.00; No. 3, \$8.50.....50¢10¢
Common Brad Sets.....50¢10¢
No. 25, \$10.00; No. 43, \$12.50.....70¢10¢5¢

Nail—

square.....\$ gr. \$4.00¢\$4.25

Round.....\$ gr. \$3.25

Buck Bros.....27¢5¢

Cannon's Diamond Point.....\$ gr. \$12, 50¢

Rivet.

Regular list.....50¢10¢

Sate—

Stillman's Genuine.....\$ dos \$5.00¢7.75, 40¢25¢

Stillman's Imita.....\$ dos \$3.25¢5.25, 40¢25¢

Stillman's C. S.....\$ dos \$4.00¢10¢

Stillman's C. S. R. H. Goods.....20¢

Stillman's C. S. R. H. Goods.....20¢

Stillman's C. S. R. H. Goods.....20¢

Stillman's C. S. R. H. Goods.....20¢

Stillman's C. S. R. H. Goods.....20¢

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Stillman's C. S. R. H. Goods.....20¢

Stillman's C. S. R. H. Goods.....20¢

Stillman's C. S. R. H. Goods.....20¢

Stillman's C. S. R. H. Goods.....20¢

Shaves, Spoke

Iron.....45¢
Wood.....30¢
Bailey's (Stanley R. & L. Co.).....40¢10¢
Stearns.....30¢10¢
Cincinnati.....35¢10¢
Goodell's, \$ dos \$9.00.....25¢

Shears—

American (Cast) Iron.....75¢10¢75¢10¢5¢

Barnard's Lamp Trimmers.....\$ dos \$3.75

Timmer's.....30¢25¢

Seymour's, List, Dec. 1891.....60¢10¢10¢60¢10¢5¢

Heinrich's, List, Dec. 1891.....60¢10¢10¢60¢10¢5¢

Heinrich's Tailor's Shears.....35¢5¢

First quality.....50¢80¢10¢

Second quality.....80¢10¢80¢10¢10¢

Acme Cast Shears.....10¢10¢

Diamond Cast Shears.....10¢10¢

Clipper.....10¢10¢

Victor Cast Shears.....75¢10¢75¢10¢5¢

Hows Bros. & Hulbert, Solid Forged Steel.....40¢

Chicago Drop Forge & F. Co., Solid Steel Forged.....60¢

Davenport Cutlery Co.....60¢60¢10¢

Clausen Shear Co., Japaned.....70¢

Clausen Shear Co., Nickel-plated, same list.....60¢

Galvanic, 3/4 to 9 in., \$ dos \$4.10¢ per inch

Pruning Shears and Hooks.

Disston's Combined Pruning Hook and Saw.....\$ dos \$18.00, 20¢10¢

Disston's Pruning Hook, \$ dos \$12.00, 20¢10¢

E. S. Lee & Co.'s Pruning Tools.....40¢

Pruning Shears, Henry's Pat., \$ dos \$3.75¢4.00

Henry's Pruning Shears, \$ dos \$4.25¢4.50

Wheeler, M. & C. Co.'s Combination, \$ dos \$12.00, 20¢

Dunlap's Saw and Chisel, \$ dos \$3.50, 30¢

Malinsson & Co., No. 1, \$5.25; No. 2, 7.25

P. S. & W. Co.....60¢

Timmer's, do.—

Shears and Snips (P. S. & W.).....30¢25¢

Snips, J. Malinsson & Co.....35¢5¢

Sheaves—

Sliding Door—

M. W. Co., Ist July, 1888.....50¢10¢60¢5¢

R. & E., Ist Dec. 18, 1885.....55¢20¢

Corbin's list.....60¢10¢25¢

Patent Roller.....60¢10¢25¢

Patent Roller, Hatfield's.....70¢

Russell's Anti-Friction, Ist Dec. 18, 1885.....60¢25¢

Moore's Anti-Friction.....50¢

Sliding Shutter

R. & E., Ist Dec. 18, 1885.....60¢10¢25¢

Sargent's list.....60¢10¢

Reading list.....60¢10¢10¢

Shells—

First quality 4, 8, 10 and 12 gauge.....25¢10¢25¢

First quality, 14, 16 and 20 gauge (\$10 list).....30¢10¢25¢

Prime.....40¢25¢

Star, Club, Rival and Climax brands.....35¢10¢25¢

Setbold's Comb. Shot Shells.....15¢25¢

Brass Shot Shells, 1st quality.....60¢25¢

Brass Shot Shells, Club, Rival, Climax.....55¢25¢

Shells Loaded—

Standard List, July 19, 1890.....40¢10¢10¢

Ship Tools—

L. & J. White.....20¢25¢

Shoes, Horse, Mule, &c.—

Horse—

Burden's, Perkins', Phoenix and Bryden's Boss, at factory.....\$4.00

Bryden's Frog Pressure, at factory.....\$5.00

Mule—

Add \$1 per keg to above prices.

Ox, Wrought—

Ton lots.....\$ 9¢

1000 lb. lots.....\$ 9¢

500 lb. lots.....\$ 10¢

Shot—

Ton lots Small lots

Drop, up to B, 25-b bag.....\$1.42

Drop, up to B, 5-b bag......35

Drop, B and larger, 25-b bag.....1.67

Drop, B and larger, 5-b bag......40

Buck and Chilled, 25-b bag.....1.67

Buck and Chilled, 5-b bag......40

Dust Shot, 25-b bag......40

Dust Shot, 5-b bag......40

Shovels and Spades—

Ames' Shovels, Spades, &c., Ist Nov. 1, 1891.....30¢

Notes: Jobbers frequently give 5¢ to 7¢ extra on above.

Griffith's Black Iron.....50¢10¢

Griffith's C. S.....60¢10¢10¢

Griffith's Solid C. S. R. H. Goods.....20¢

St. Louis Shovel Co.....30¢20¢75¢

Hussey, Hines & Co.....15¢25¢

Hubbard & Co.....30¢40¢75¢

Lehigh Mfg. Co.....50¢10¢

H. M. Myers Co.....30¢

Payne Pettibone & Son.....35¢45¢

Remington's (Lowman's) Pat.....80¢10¢40¢

Rowland's, Black Iron.....50¢10¢

Rowland's Steel.....60¢25¢60¢10¢

Shovels and Tongs—

Iron Head.....60¢10¢60¢10¢5¢

Brass Head.....60¢10¢10¢

Staves—

Mann's Tin Rim.....50¢25¢

Buffalo Metallic, S. & Co.....50¢25¢

Shaker (Barler's) Pat. Flour Sifters.....\$ dos \$2.00; \$ gr \$21.00

Electric.....\$ dos \$2.00

A. & W. Sifters.....\$ dos \$2.00

Hunter's.....\$ dos \$2.00

Smith's Adjustable Sifters.....\$ dos \$2.00

Smith's Adjustable Milk Strainer.....\$ dos \$2.00

Smith's Adjustable T. & C. Strainer.....\$ dos \$1.25

Staves, Wooden Rim—

Mesh 18, Nested, \$ dos.....80¢ \$1.00

Mesh 20, Nested, \$ dos.....95¢ \$1.10

Mesh 24, Nested, \$ dos.....\$1.15 \$1.25

Skins, Thimble—

Western list.....75¢5¢75¢10¢
Columbus Wrt. Steel, Special net prices
Coldbrookdale Iron Co.....60¢
Seneca's Mill Pattern.....60¢
Utica P. S. & T. Skins.....60¢
Utica Turned and Fitted.....35¢

Slates—

School, by case.....60¢10¢50¢10¢10¢

Snaps, Harness, &c.—

Anchor (T. & S. Mfg. Co.).....65¢

Fitch's (Bristol).....50¢10¢

Hotchkiss.....10¢

Andrews.....50¢

Agent's Patent Guarded.....70¢10¢10¢

German new list.....40¢10¢

Covert.....50¢10¢5¢2¢

Covert, New Patent.....60¢10¢5¢2¢

Covert, New R. E.....60¢10¢5¢2¢

Covered Spring.....60¢10¢10¢

Snaths, Scythe.

List.....50¢

Soldering Irons—See Irons, Soldering.

Spittoons, Cuspidors, &c.

Standard Fiberglass—

Cuspidors, 8 1/2-inch, \$ dos., No. 5, \$8;

No. 6, \$9.

Spittoons, Dalay, 8-inch, No. 1, \$4; 10

and 11 inch, \$6.

Spoke Shavers—See Shaves, Spoke.

Spoke Trimmers—See Trimmers, Spoke.

Speons and Forks—

Tinned Iron—

Basting, Cen. Stamp. Co.'s list.....70¢10¢

Solid Table and Tea, Cen. Stamp. Co.'s

list.....70¢10¢

Buffalo S. S. & Co.....35¢45¢

Silver-Plated—(4 mos. or 5¢ cash 30

days).

Meriden Brit. Co., Rogers.....40¢15¢

C. Rogers & Bros.....40¢15¢

Rogers & Bros.....40¢15¢

Reed & Barton.....40¢40¢5¢

Wm. Rogers Mfg. Co.....40, 15¢25¢

Simpson, Hall, Miller & Co.....40, 15¢25¢

Holmes & Edwards Silver Co., 40, 15¢25¢

Tinware—
Stamped, Japanned and Piced, list
Jan. 20 1887.....70¢10¢70¢25¢

Tire Benders, Upsetters, &c—
See Benders and Upsetters, Tire.

Tools.
Coopers—
Bradley's.....30¢
Barton's.....30¢
L. & J. White.....30¢
Albertson Mfg. Co.....30¢
Beatty's.....30¢
Sandusky Tool Co.....30¢
Shaves, Cincinnati Tool Co.....30¢

Lumber.
Ring Peavies, "Blue Line".....\$20.00
Ring Peavies, Common.....\$18.00
Steel Socket Peavies.....\$21.00
Mall Iron Socket Peavies.....\$19.00
Cant Hooks, "Blue Line".....\$15.00
Cant Hooks, Common Finish.....\$14.00
Cant Hooks, Mall. Socket Clasp, "Blue Line" Finish.....\$16.00
Cant Hooks, Mall. Socket Clasp, Common Finish.....\$14.50
Cant Hooks, Clip Clasp, "Blue Line" Finish.....\$14.00
Cant Hooks, Clip Clasp, Common Finish.....\$12.00
Hand Spikes.....\$5.00, \$15.00, \$18.00, \$20.00
Pike Poles, Pike & Hook, \$ dos, 15 ft., \$11.50; 14 ft., \$13.50; 16 ft., \$14.50; 18 ft., \$17.50; 20 ft., \$21.50
Pike Poles, Pike only, \$ dos, 15 ft., \$10.00; 14 ft., \$11.00; 16 ft., \$13.00; 18 ft., \$16.00; 20 ft., \$20.00
Pike Poles, not ironed, \$ dos, 12 ft., \$6.00; 14 ft., \$7.00; 16 ft., \$8.00; 18 ft., \$12.00; 20 ft., \$16.00
Setting Poles, \$ dos, 15 ft., \$14.00; 14 ft., \$15.00; 16 ft., \$17.00
Swamp Hooks.....\$ dos \$18.00

Saw.
Atkins' Perfection.....\$ dos \$12.00
Atkins' Excelsior.....\$ dos \$6.00
Atkins' Giant.....\$ dos \$4.00

Tobacco Cutters—See Cutters, Tobacco.

Transom Lifters—See Lifters, Transom.

Traps—

Game—
Newhouse.....40¢
Onida Pattern.....70¢
Game, Blake's Patent.....40¢
Mouse and Rat—
Mouse Wood Choker, \$ dos holes, 11¢12¢
Mouse, Round Wire.....\$ dos \$1.50
Mouse, Cage, Wire.....\$ dos \$2.50, 15¢
Mouse, Catch-em-alive.....\$ dos \$2.50, 15¢
Mouse, Bonanza.....\$ dos \$2.00, \$1.00
Rat, Decoy.....\$ gr \$10.00, 10¢
Ideal.....\$ gr \$10.00, 10¢
Cyclone.....\$ gr \$5.25
Hotchkiss Metallic Mouse, 6-hole trap, \$ dos, 90¢; in full cases, \$ dos.....75¢
Hotchkiss Imp. Rat Killer.....\$ gr \$15.50
Schuyler's New Rat Killer.....\$ gr \$15.50
Schuyler's Rat Killer.....\$ gr \$15.50

Trimmers—

Trimmers, Spoke.

Bonney's.....\$ dos \$10.00, 50¢
Stearns'.....\$ dos \$10.00, 50¢
Ives' No. 1, \$15.00; No. 2, \$12.00, \$ dos.....55¢10¢
Douglas'.....\$ dos \$9.00, 30¢
Cincinnati.....\$ dos \$9.00, 30¢

Trowels—
Lothrop's Brick and Plastering.....20¢10¢5¢35¢
Reed's Brick and Plastering.....15¢
Disston's Br'k and Plastering.....25¢
Peace's Plastering.....25¢
Clement & Maynard's.....30¢
Rode's Brick.....15¢
Worral's Brick and Plastering.....25¢
Garden.....70¢

Trucks, Warehouse, &c.—

B. & L. Block Co.'s list, '89.....40¢

Tubes, Boiler—

See Pipe.

Twine—
Flax Twine— BC. B.
No. 9, 10 and 11 Balls.....25¢ 31¢
No. 12, 13 and 14 Balls.....22¢ 30¢
No. 18, 19 and 20 Balls.....20¢ 29¢
No. 24, 25 and 26 Balls.....20¢ 29¢
No. 30, 31 and 32 Balls.....18¢ 28¢
No. 36, 37 and 38 Balls.....15¢ 25¢
Chalk Line, Cotton, 1/4 & 1/2 Balls.....5¢
Mason Line, Linen, 1/4 & 1/2 Balls.....5¢
2-Ply Hemp, 1/4 and 1/2 Balls (Spring Twine).....15¢
3-Ply Hemp, 1/4 Balls.....15¢
3-Ply Hemp, 1/2 Balls.....15¢
2, 3, 4 and 5-Ply Lute, 1/2 & 1 Balls.....15¢
Wool.....15¢
Paper.....15¢
Cotton Mops, 6, 9, 12 and 15 to do.....15¢

Vises—

Solid Box.....50¢10¢50¢10¢25¢
Parallel—
Fisher & Norris Double Screw.....15¢10¢
Hopkins.....25¢30¢
Stephens.....25¢30¢
Wilson's.....55¢
Howard's.....40¢
Bonney's.....40¢10¢
Miller's Falls.....40¢40¢10¢
Trenton.....40¢40¢10¢
Sargent's.....15¢30¢
Backus and Union.....40¢
Double Screw Leg.....15¢10¢
Prentiss.....20¢25¢
Simpson's Adjustable.....40¢
Moore's.....20¢
Massey Quick Action.....20¢ 25¢

Saw Filers—

Bonney's, Nos. 2 & 3, \$15.00.....40¢10¢
Stearns'.....33¢4¢10¢33¢4¢10¢10¢
Stearns' Silent Saw Vises.....33¢4¢10¢
Sargent's.....40¢40¢10¢
Reading.....\$ dos \$17.50, 10¢
Wentworth.....20¢10¢

Miscellaneous.

Combination Hand Vises.....\$ gr \$42.00
Cowell Hand Vises.....20¢
Bauer's Pipe Vises.....10¢
Cincinnati.....25¢10¢
Enterprise Pipe Vises, each.....\$3.00
Massey Combination Pipe.....40¢

Wads—Price per M.

J.M.C. & W.R.A.—B.E., 11 up.....65¢
J.M.C. & W.R.A.—B.E., 9 to 10.....85¢
J.M.C. & W.R.A.—B.E., 8.....95¢
J.M.C. & W.R.A.—B.E., 7.....11¢10¢
J.M.C. & W.R.A.—P.E., 11 up.....1.15
J.M.C. & W.R.A.—P.E., 9 to 10.....1.15
J.M.C. & W.R.A.—P.E., 8.....1.70
J.M.C. & W.R.A.—P.E., 7.....1.80
Slay's B.E., 11 up.....\$1.00, \$1.75
Slay's P.E., 11 up.....3.00, 3.25

Wagon Boxes—See Boxes, Wagon.

Washer Cutters—See Cutters, Washer.

Wagon Jacks—See Jacks, Wagon.

Ware, Hollow, Enameled, &c.

Cast Iron, Hollow—
Stove Hollow-Ware.....60¢10¢
Ground.....60¢10¢10¢
Unground.....60¢10¢10¢
White Enameled-Ware.....70¢10¢70¢10¢25¢
Maltin Kettles.....60¢10¢60¢
Boilers and Saucepans.....60¢10¢60¢
Tinned Boilers and Spans.....60¢10¢60¢
Rustless Hollow-Ware.....60¢50¢25¢
Gray Enameled-Ware.....50¢
Stove.....60¢10¢10¢
Maltin Kettles.....60¢10¢10¢
Boilers and Saucepans.....60¢25¢

Enameled—
Agate and Granite Ware, list Jan. 1, 1889.....33¢4¢10¢
Ironclad Enameled Ware.....dis 33¢4¢10¢

Kettles—
Galvanized Tea-Kettles—
Inch.....6 7 8 9
Each.....55¢ 60¢ 75¢ 75¢

Standard Fiber—

Wash-Basins, 10 1/2 in.....\$2.00
Wash-Basins, 12 in.....2.25
Keelers, 11 1/2 in.....4.00
Cuspidors, "Daisy," 8 in.....4.00
Pek Measure.....4.00
Half-pek Measure.....3.50
See also Pails.

Indurated Fiber—25¢

Spittoons, No. 2, \$ dos.....\$8.40
Basins, Ringed, \$ dos, No. 2.....\$3.00
Washbubs, Nested, Nos. 0, 1, 2 and 3 (4 pieces), \$ nest.....\$7.50
Keelers Nested, Nos. 1, 2, 3 and 4 (4 pieces), \$ nest.....\$2.90
Butter Bowls 15, 17 and 19 inch (3 pieces), \$ nest.....\$1.70
Liquid Measures, pt., qt., 2 qt. and funnel (4 pieces), \$ set.....\$1.60
See also Pails.

Silver Plated, Hollow—

4 mo. or 5 ¢ cash in 30 days.
Reed & Barton.....40¢5¢
Meriden Britannia Co.....40¢5¢
Simpson, Hall, Miller & Co.....40¢5¢
Rogers & Brother.....40¢5¢
Hartford Silver Plate Co.....40¢5¢
William Rogers Mfg. Co.....40¢5¢

Washers—

Size hole.....5-16 3/4 1/2 3/4 1/2 1/2
Washers.....6 5 3.50 3
In lots less than 200, \$ ¢, add 1/4 ¢, 6-8 boxes 1¢ to list.

Wedges—

Iron.....\$ ¢ 3/4
Steel.....\$ ¢ 3/4

Weights, Sash—

Solid Eyes.....\$ ton \$15¢\$19

Well Buckets, Galvanized—See Buckets, Well, Galvanized.

Wheels, Well.

8 in., \$2.25; 10 in., \$2.70; 12 in., \$3.25

Wire and Wire Goods—

Iron—

Market.
Br. & Ann'd, Nos. 0 to 18.....77¢
Cop'd, Nos. 0 to 18.....75¢

Galv., Nos. 0 to 18.....67¢
Tin'd, Tinned list Nos. 0 to 18.....67¢
Stone.
Br. and Ann'd, Nos. 16 to 18.....77¢
Bright and Ann'd, Nos. 19 to 20.....80¢
Br. and Ann'd, Nos. 27 to 30.....82¢
Tinned.
Tinned Broom Wire, 18 to 21, \$ ¢.....5¢
Galvanized Fence, Nos. 8 and 9.....70¢
Brass, list Jan. 18, 1884.....35¢
Copper, list Jan. 18, 1884.....35¢
Annealed Wire on Spools.....55¢
Maltin Steel and Tin'd on Spools.....55¢
Maltin's Brass and Con. on Spools.....45¢
Tate's Spooled, Tinned and Annealed.....55¢
Tate's Spooled Cop. and Brass.....45¢
Cast Steel Wire.....50¢
Stub's Steel Wire.....\$1.00 to 2.30
Steel Music Wire, 19 to 30.....60¢70¢
Wire Clothes Lines, see Lines.
Wire Picture Cord see cord.

Bright Wire Goods—

Standard list.....30¢10¢

Wire Cloth and Netting.

Painted Screen Cloth, good quality.....\$100 sq. ft., \$1.40

Galvanized Wire Netting.....70¢10¢75¢

Wire, Barb.—F.o.b. Cars. Dis. 5 ¢ cash in 10 days.

Pittsburgh and Cleveland.....\$2.55
Akron, Cincinnati and.....3.05

St. Louis.....2.85 3.15

Keokuk.....2.75 3.25

Lockport, Baker Perfect.....2.85 3.35

Lawrence and Omaha.....2.90 3.40

San Francisco.....3.80 4.30

Wire Rope—See Rope, Wire.

Wrenches—

American Adjustable.....40¢
Baxter's Adjustable "S".....40¢10¢50¢
Baxter's Diagonal.....40¢10¢50¢
Coe's Genuine.....50¢35¢
Coe's "Mechanics".....50¢10¢35¢
Girard Standard.....65¢10¢
Lamson & Sessions' Engineers'.....60¢10¢
Lamson & Sessions' Standard.....70¢10¢
P. S. & W. Agricultural.....75¢10¢75¢
Girard Agricultural.....10¢5¢
Lamson & Sessions' Agri'l.....10¢5¢
Bemis & Call's
Pat. Combination.....55¢
Merrick's Pattern.....35¢
Brigg's Pattern.....35¢
Cylinder or Gas Pipe.....40¢5¢
No. 3 Pipe.....40¢10¢
Allen's Pocket (Bright).....\$2.00, 50¢10¢
The Favorite Pocket.....\$ dos \$4.00, 40¢
Webster's Pat. Combination.....35¢
Boardman's.....30¢10¢
Always Ready.....25¢5¢
Alligator.....50¢
Donohue's Engineer.....30¢10¢
Acme, Bright.....50¢25¢
Acme, Nicked.....40¢25¢
Hercules.....70¢
Walker's.....55¢35¢
Diamond Steel.....55¢35¢
Cincinnati Brace Wrenches.....25¢10¢
Tat's Vise Wrench.....55¢10¢35¢

Wringers, Clothes—

Am. Wringer Co.'s list, July 15, 91, 3 ¢ cash

Colby Wringer Co., list Sept. 1, 91, 3 ¢ cash

Wrought Goods—

Staples, Hooks, &c., list Jan. 12, 1886, 85¢85¢10

PAINTS, OILS AND COLORS.—Wholesale Prices.

Animal and Vegetable Oils.

Linsed, City, raw, per gal. 37 ¢ ..
Linsed, City, boiled.....40 ¢ ..
Linsed, Western, raw.....35 ¢ 36 ¢
Lard, City, Extra Winter.....60 ¢ ..
Lard, City, Prime.....53 ¢ 54 ¢
Lard, City, Extra No. 1.....42 ¢ 45 ¢
Lard, City, No. 1.....37 ¢ 40 ¢
Lard, Western, prime.....52 ¢ 53 ¢
Cotton-seed, Crude, prime.....24 ¢ 25 ¢
Cotton-seed, Crude, off grades.....22 ¢ 23 ¢
Cotton-seed, Summer Yellow, prime.....30 ¢ ..
Cotton-seed, Summer Yellow, off grades.....27 ¢ 29 ¢
Sperm, Crude.....50 ¢ 70 ¢
Sperm, Natural Spring.....50 ¢ ..
Sperm, Bleached Spring.....50 ¢ ..
Sperm, Natural Winter.....75 ¢ 75 ¢
Sperm, Bleached Winter.....75 ¢ 80 ¢
Whale, Crude.....45 ¢ 45 ¢
Whale, Natural Winter.....54 ¢ 55 ¢
Whale, Bleached Winter.....56 ¢ 58 ¢
Whale, Extra Bleached.....58 ¢ 60 ¢
Sea Elephant, Bleached
Winter.....63 ¢ 64 ¢
Menhaden, Crude, Southern.....50 ¢ 50 ¢
Menhaden, Light Pressed.....54 ¢ 55 ¢
Menhaden, Bleached W'ter.....36 ¢ 37 ¢
Menhaden, Extra Bleached.....35 ¢ 39 ¢
Tallow, City, prime.....43 ¢ ..
Tallow, Western, prime.....43 ¢ ..
Cocoonut, Ceylon.....6 ¢ 64 ¢
Cocoonut, Cochinchina.....7 ¢ 74 ¢
Cod, Domestic.....35 ¢ 40 ¢
Cod, Foreign.....35 ¢ ..
Red Elaine.....36 ¢ 38 ¢
Red Saponified.....5 ¢ 64 ¢
Bank.....35 ¢ 35 ¢
Strait.....35 ¢ 34 ¢
Olive, Italian, bbls.....55 ¢ 55 ¢
Neatfoot, prime.....55 ¢ 55 ¢
Palm, prime, Lagos.....6 ¢ 64 ¢

Mineral Oils.

Black, 29 gravity, 25 ¢ 30 ¢ cold test.....74¢ 8 ¢
Black, 29 gravity, 15 cold test.....84¢ 9 ¢
Black, 30 gravity, summer.....64¢ 9 ¢
Cylinder light, filtered.....15 ¢ 20 ¢

Cylinder, dark, filtered.....12 ¢ 15 ¢
Cylinder, dark, st'm refined.....10 ¢ 15 ¢
Paraffine, 23 1/2 to 24 gravity.....12¢ 14 ¢
Paraffine, 25 gravity.....12¢ 13 ¢
Paraffine, 28 gravity.....9¢ 10 ¢
Paraffine, red, 21 to 22 gravity.....9 ¢ ..
Paraffine, red, 22 to 23 gravity.....15 ¢ 14 ¢

Paints and Colors.

Barytes, Foreign, \$ ton \$23.00.....\$24.00
Barytes, Amer. floated.....\$20.00
Barytes, Amer. No. 1.....\$19.00
Barytes, Amer. No. 2.....\$13.00
Barytes, Amer. No. 3.....\$11.00
Blue, Celestial.....\$ ¢ 6 ¢ 8 ¢
Blue, Chinese.....50 ¢ 55 ¢
Blue, Prussian.....25 ¢ 40 ¢
Blue, Ultramarine.....8 ¢ 25 ¢
Brown, Spanish.....34 ¢ 1 ¢
Brown, Vandyke, Amer.....3 ¢ 34 ¢
Brown, Vandyke, English.....6 ¢ 8 ¢
Carmine, No. 40, in bulk.....3.10 ¢ ..
Carmine, No. 40, in boxes or barrels.....3.30 ¢ ..
Carmine, No. 40, in ounce bottles.....4.20 ¢ ..
Chalk, in bulk.....\$ ton.....1.95 ¢
Chalk, in bbls.....\$ 100 ¢.....33 ¢ 40 ¢
China Clay, English.....\$ ton.....18.00 ¢
Cobalt Oxide, prep'd.....\$ 2.90 ¢ ..
Cobalt Oxide, black.....lots 100's.....2.60 ¢ ..
Cobalt Oxide, black.....less 100's.....2.65 ¢ ..
Green, Paris, in bulk.....14 ¢ 15 ¢
Green, Paris, 170 to 175 ¢ kgs.....14¢ 15¢
Green, Paris, small pack.....16 ¢ 21¢
Green, Chrome, ordinary.....8 ¢ 11 ¢
Green, Chrome, pure.....22 ¢ 25 ¢
Lead, Eng. B.B. white.....84¢ 10 ¢
Lead, Ann. White, dry or in oil.....Kgs, lots less than 500 ¢.....7¢
Kgs, lots 500 ¢ to 5 tons.....7 ¢
Kgs, lots 5 tons to 12 tons.....6¢
Kgs, lots 12 tons and over.....6¢
Lead, White, in oil 25 ¢ tin pails add to kee price.....¢ 1/2
Lead, White, in oil 12 1/2 ¢ tin ails, add to kee price.....¢ 1

Lead, White, in oil, 1 to 5 ¢ as sorted tins, add to kee price.....¢ 3/4
Lead, Red, bbls, and 1/2 bbls.....6¢ 7 1/4 ¢
Lead, Red, kgs.....6¢ 7 1/4 ¢
Litharge, kgs.....6¢ 7 1/4 ¢
Litharge, bbls, and 1/2 bbls.....6¢ 7 1/4 ¢
Terms, &c.—Lead and Litharge.—On lots of 500 ¢ or over, 60 days' time or 2 1/2 ¢ discount for cash if paid within 15 days of date of invoice.
Ocher, Rochelle.....1.35 ¢ 1 1/4 ¢
Ocher, French Washed.....1 1/4 ¢ 2 1/4 ¢
Ocher, German Washed.....1 1/4 ¢ 3 ¢
Ocher, American.....9 ¢ 14 ¢
Orange Mineral, English.....10 ¢ 10 1/2 ¢
Orange Mineral, French.....10 ¢ 10 1/2 ¢
Orange Mineral, German.....9 1/4 ¢ 10 ¢
Orange Mineral, American.....8 ¢ 8 1/4 ¢
Paris White, English Cliff stone.....1.00 ¢ 1.15 ¢
Paris White, American.....70 ¢ 75 ¢
Red, Indian, English.....5 1/4 ¢ 7 ¢
Red, Indian, American.....2 ¢ 14 ¢
Red, Turkey.....9 ¢ 11 ¢
Red, Venetian, American.....\$ 100 ¢ 1.00 ¢ 1.25 ¢
Red, Venetian, English.....1.00 ¢ 1.50 ¢

Vermilion, Imitation, Eng. 8 ¢ 25 ¢
Vermilion, Trieste.....87¢ 90 ¢
Vermilion, Chinese.....90 ¢ 95 ¢
Whiting, Common, \$ 100 ¢ 40 ¢ 45 ¢
Whiting, Gliders.....40 ¢ 45 ¢
Zinc, American, dry.....44¢ 5 ¢
Zinc, French, Red Seal.....¢ 84 ¢
Zinc, French, Green Seal.....¢ 84 ¢
Zinc, French, V. M. X.....¢ 7 ¢
Zinc, Antwerp, Red Seal.....¢ 7 1/4 ¢
Zinc, Antwerp, Green Seal.....¢ 8 ¢
Zinc, German, L. Z. O.....¢ 6 1/2 ¢
Zinc, V. M. in Poppy Oil, G Seal, lots of 1 ton and over.....10¢ 11 1/4 ¢
Zinc, V. M. in Poppy Oil, Red Seal.....10 ¢ 10 1/4 ¢
Lots of less than 1 ton.....104¢ 104 ¢
Discounts.—French Zinc.—Discounts to buyers of 10 bbl. lots of one or assorted grades, 1 ¢; 25 bbls, 2 ¢, 50 bbls, 4 ¢. No discount allowed on less than bbl. lots.

Colors in Oil.

Blue, Chinese.....\$ ¢ 35 ¢ 40 ¢
Blue, Prussian.....20 ¢ 45 ¢
Blue, Ultramarine.....12 ¢ 18 ¢
Brown, Vandyke.....7 ¢ 12 ¢
Green, Chrome.....4 ¢ 13 ¢
Green, Paris.....18 ¢ 18 1/4 ¢
Sienna, Raw.....7 ¢ 14 ¢
Sienna, Burnt.....7 ¢ 14 ¢
Umber, Raw.....7 ¢ 10 ¢
Umber, Burnt.....7 ¢ 10 ¢

Putty.

In barrels and 1/2 bbls.....1.95 ¢ 1.45 ¢
In tubs......015¢ ¢ .014 ¢
In tin cans......015¢ ¢ .023 ¢
In bladders......015¢ ¢ .033 ¢

Spirits Turpentine.

In regular bbls.....36¢ ¢ ..
In machine bbls.....37 ¢ ..

Glue.

Low Grade.....\$ ¢ 8 ¢ 10 ¢
Cabinet.....12 ¢ 14 ¢
Medium White.....12 ¢ 15 ¢
Extra White.....12 ¢ 20 ¢
French.....10 ¢ 25 ¢
English.....10 ¢ 12 ¢
Irish.....12 ¢ ..

